

**“ECONOMICS OF PRODUCTION AND MARKETING OF
SWEET ORANGE IN JALNA DISTRICT OF
MAHARASHTRA”**

By

Mr. Vidhate Namdeo Sudhakar

(Reg. No. R/013/126)

A Thesis submitted to the
MAHATMA PHULE KRISHI VIDYAPEETH,
RAHURI - 413 722, DIST. AHMEDNAGAR,
MAHARASHTRA, INDIA

in partial fulfilment of the requirements for the degree

of

MASTER OF SCIENCE (AGRICULTURE)

in

AGRICULTURAL ECONOMICS

DEPARTMENT OF AGRICULTURAL ECONOMICS

POST GRADUATE INSTITUTE
MAHATMA PHULE KRISHI VIDYAPEETH,
RAHURI - 413 722, DIST. AHMEDNAGAR
MAHARASHTRA STATE (INDIA)

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C E R T I F I C A T E

This is to certify that the thesis entitled, **“ECONOMICS OF PRODUCTION AND MARKETING OF SWEET ORANGE IN JALNA DISTRICT OF MAHARASHTRA”**, submitted to the Faculty of Agriculture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar in partial fulfilment of the requirement for the award of the degree of **MASTER OF SCIENCE (AGRICULTURE)** in **AGRICULTURAL ECONOMICS**, is a record of *bona fide* research work carried out by **MR. VIDHATE NAMDEO SUDHAKAR**, under my guidance and supervision and that no part of the thesis has been submitted for any other degree or diploma.

The assistance and help received during the course of this investigation and sources of literature referred to have been duly acknowledged.

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Date : / /2015

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ABBREVIATIONS

/	- Per
Agril.	- Agriculture
e.g.	- Exempli gratia (For example)
Econ.	- Economics
<i>et al.</i>	- <i>et alia</i> (and others)
<i>etc.</i>	- Etcetera
Fig.	- Figure
FYM	- Farm yard manure
ha	- Hectare
i.e.	- That is
J.	- Journal
kg	- Kilogram
Mha	- Million hectares
MT	- Metric tonnes
qtl.	- Quintals
qty.	- Quantity
Res.	- Research
₹.	- Rupees
Univ.	- University
Viz.,	- Videlicet (namely)
CGR	- Annual Compound Growth Rate
@	at the rate
kg	- Kilograms
MVP	- Marginal Value product
GM	- Geometric mean
MP	- Marginal product
Mktg	- Marketing
Vol	- Volume
PP	- Page Number

ABSTRACT

“ECONOMICS OF PRODUCTION AND MARKETING OF SWEET ORANGE IN JALNA DISTRICT OF MAHARASHTRA”

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2015

Research Guide	:	Dr. B.V. Pagire
Department	:	Agricultural Economics

India made a lot of progress in agriculture since independence in terms of area, production and productivity of various diversified crops. Today India is the second largest producer of fruits, sweet orange is a fruit crop among them. The present investigation was undertaken to study in detail economics of production and marketing of sweet orange in Jalna district of Maharashtra. An attempt has been made to estimate costs, returns, resource productivities, resource use efficiencies, marketing cost and problems faced by sample sweet orange grower in production and marketing of sweet orange.

Keeping in view the highest acreages under sweet orange, Ambad and Badnapur tahsils from Jalna district were purposely selected.

The cultivators were selected purposively having the sweet orange orchards from the selected villages. Six villages

Abstract contd...**Mr. Vidhate N.S.**

were selected from these tahsils. Thirty sweet orange growers from each size groups *viz.*, small (upto 0.20 ha), medium (0.21 to 0.40 ha) and large (0.41 ha and above) on the basis of actual area under sweet orange orchard were studied, thus final sample comprised of 90 sweet orange growers. The primary data collected for the agriculture year 2014-15 were analyzed by using simple tabular approach and also functional analysis method.

The per hectare cost of establishment was highest i.e. ₹ 122986.66 in large size group followed by ₹ 108609.83 in medium size group and ₹ 95684.56 in small size group. The major items of cost were cost on account of manures and fertilizers. Regarding cost of maintenance of sweet orange, cost 'A' was maximum incase of large size group (₹ 110526.28) followed by small size group (₹ 110361.79) and medium size group (₹ 107013.27). The manures, fertilizers, hired human labour and family labours were the major items of cost 'C'.

Sweet orange is a profitable fruit crop with 2.15 B:C ratio. The small gardens were maintained efficiently by the farmers. Hence, the small gardens were more profitable than large gardens. The result of estimated Cobb-Douglas production function showed that human labour, bullock labour, manure and nitrogen were positive and significant influencing the yield of sweet orange.

Production and disposal pattern of sweet orange indicated that 98.12 per cent of produce was marketed. The sweet oranges were graded into three grades, among those grade-I was maximum (41.88 per cent) of the total production.

In sweet orange marketing, three marketing channels were identified among which channel-III : Producer - Wholesaler - Retailer -Consumer mostly preferred by growers. Maximum sweet oranges (52.05 per cent) were sold through channel-III followed by channel-I : Producer – Retailer - Consumer (30.26 per cent). The per quintal cost of marketing was found ₹ 274.83. Average per quintal price realized at the overall level was ₹ 2850.51.

The major problems faced by grower in production of sweet orange were non availability of labour during peak period, unavailability of quality seedlings, losses due to pest and diseases. In case of marketing the major problems were high commission charges and high transport charges etc.

The efforts should be made to raise the managerial ability in the field of both production and marketing of sweet orange. As far as possible the technical guidance should be made more advanced and effective to produce quality products, co-operative associations should be established and existing co-operative must increase their efficiency and undertake various activities like development of infrastructure facilities, input supply, processing and marketing.

CANDIDATE'S DECLARATION

*I hereby declare that this thesis or part
there of has not been submitted
by me or other person to any
other University or Institute
for a Degree or
Diploma*

Place : M.P.K.V., Rahuri

(Namdeo S. Vidhate)

Dated : / /2015

1. INTRODUCTION

India is an agricultural country where 65 per cent population is dependent on agriculture. This forms the main source of income. Fruits have been the mans food from time immemorial. Fruit culture has been practiced in India since ancient times. The *Mughals* established many mango orchards all over the country. This art later on gradually civilized into skillful and intensive forms of land utilization.

Agriculture continues to be the mainstay of our economy as it occupies the central place in rural life. Horticultural industry is fast emerging and the most remunerative sector. Horticultural crops are characterized by high productivity, higher returns, and higher potential for employment generation and exports, comparatively lower requirement of water and easy adaptability to adverse soil and waste land situations. Pomology (cultivation of fruits) is one of the important branch of horticulture and fruits are the man's oldest food. Indian Council of Medical Research (ICMR) has recommended the consumption of at least 92 grams of fruits per day and as much variety as the season permits. On the contrary, the per capita consumption of fruits in India is only 46 grams per day. This indicates the wide gap between the consumption and requirement of fruits (Anonymous, 2001). The major fruit crops grown in India are mango, banana, citrus, grapes, guava, papaya, sapota, pomegranate, jackfruit, ber, aonla etc.

1.1 Importance of fruit production

Cultivation of fruit crops plays an important role in the prosperity of a nation. The production of fruits contributes to the health, happiness and welfare of the nation.

The economic aspect of fruit production is very important in case of well maintained and established orchard which brings better return than field crops from the same piece of land. Although the expenses involved in establishing orchard are much more than raising cereal crops, this expenditure can be compensated to a great extent if farmer grows intercrops like vegetables and pulses during early stage of orchard life by the time the tree come into bearing.

A cultivator who grows only cereals or pulse crops cannot keep himself and his family labour engaged during slack period, while a fruit growers remain engaged throughout the year and can fully utilize the permanent labour maintained by them. Moreover, fruit growing is one of the important branch of diversified farming. It also promises the development of several ancillary industries like preservation, dehydration, essential oils, packing, transport and refrigeration, etc.

1.2 Importance of fruits in human life

It is well known that man cannot live on cereals or pulses alone. To supplement normal body requirements, it has been suggested by the World Health Organization (WHO) that a working man should take at least 60 gm of fruit per day in addition to cereals, pulses, milk, vegetables, eggs, etc. Fruits are chief source of vitamins, without which human body cannot

maintain proper health and resistance to disease. They also contain minerals, salts, the deficiency of which can lead to disturbances of metabolism resulting in ill health. Many fruits are also considered to possess specific medicinal value. For all the reason, the use of fruits in our daily diet is imperative.

Fruits and vegetables are the prime sources of vitamins and minerals without which human body cannot maintain proper health to resist the diseases, their role in improving the environment and aesthetic value is an added advantage. India is endowed with wide agro climatic conditions that offer immense scope for cultivation of various kinds of fruit crops. This provides an excellent platform for the country to emerge as a leading producer of fruit crop. In India, the total area under fruit crops was 1.12 million hectares in 1951-52 and increased to 6.13 million ha and the production of fruits has also increased from 11.7 million tonnes in 1950 to 59.29 million tonnes in 2007-08 and in 2013-2014 it was 7.2 million hectares and production 88.9 million metric tonnes (Indian Horticulture Database, 2015)

At present, the area under sweet orange is 394.9 thousand hectare in India. Out of this, nearly 95 thousand hectare area is covered in Maharashtra, which produces sweet orange fruits of over 712.5 metric tonnes (*Indiastat.com*). Sweet orange is generally used for juice purpose .Sweet orange is one of the rich source of nutrients particularly calories, occupying top place in the world fruit map.

Sweet orange is commercially cultivated in Nagpur and Amravati districts of Vidharbha region and Dhule district of Western Maharashtra and Jalna, Aurangabad districts of Marathwada region of Maharashtra.

World Scenario

Sweet orange (*Citrus sinensis* L.) belonging to the family Rutaceae. The fruit is native of North Eastern India, China and Myanmar. At global level, sweet orange production is 71 per cent and at National level it is 25 per cent (Horticulture Information Service, 2015). In World, China stands first in area and production while United States stands first in productivity. India stands second in area and production while stands eighth in productivity as shown in Table 1.1.

Table 1.1 Major fruit producing countries in the world (2013-14)

Country	Area ('000'Ha)	Per cent	Production ('000'MT)	Per cent	Productivity (MT/Ha)	Rank		
						A	P	Y
China	11834.45	20.58	137066.75	20.94	11.6	1	1	8
India	7216.32	12.55	88977.14	13.60	11.6	2	2	8
Brazil	2325.38	4.04	38368.68	5.86	16.5	3	3	3
U.S.	1137.78	1.98	26548.86	4.06	23.3	7	4	1
Indonesia	796.53	1.39	17744.41	2.71	22.3	10	5	2
Philippines	1240.37	2.16	16370.97	2.50	13.2	6	6	5
Mexico	1256.73	2.19	15917.81	2.43	12.7	5	7	6
Turkey	1102.66	1.92	14974.56	2.29	13.6	9	8	4
Spain	1539.10	2.68	13996.45	2.14	9.1	4	9	9
Italy	1125.59	1.96	13889.22	2.12	12.3	8	10	7
Others	27924.52	48.56	270594.59	41.35	9.7			
World Total	57499.43	100.00	654449.44	100.00	11.4			

Source : FAO website:Feb.2015 , Indian Horticulture Database 2015

Indian Scenario

According to the data published by National Horticulture Board of India 2015, there is decrease in the area of sweet orange cultivation in India from 346.3 thousand ha in 2009-10 to 161.7 thousand ha in 2011-12, similarly, the production has decreased from 3882.4 thousand million tonnes to 1231.9 thousand million tonnes during the same period as depicted in Table 1.2.

After 2011-12, the area and productivity both increased and reached a level of 394.9 thousand hectare and 3886.2 thousand metric tonne production and 11.6 MT/ha productivity in the year 2013-14.

Table 1.2 Area, Production and Productivity of Sweet orange In India

Year	Area (‘000’ ha)	Production (‘000’ MT)	Productivity (MT/ha)
2008-09	317.8	3567.4	11.2
2009-10	346.3	3882.4	11.2
2010-11	157.0	1316	8.4
2011-12	161.7	1231.9	7.6
2012-13	323.2	3519.9	10.9
2013-14	394.9	3886.2	11.6

Source: Director of Horticulture, 2015

1.3 Position of sweet orange in India

Major Sweet orange producing states are Telangana, Andhra Pradesh, Maharashtra, Karnataka, Punjab, Madhya Pradesh etc. Although India is the second largest producer of fruits crops in the world and third in orange. Total sweet orange production in India is 3886.2 thousand metric tones, Out of which Telangana produces 1656 thousand metric tones.

Maharashtra stands third in area and production while stands fifth in productivity during the year 2013-14.

Table 1.3. State wise Area, Production and Productivity of sweet orange

State	2011-12			2012-13			2013-14		
	Area (000 ha)	Prod. (000 MT)	Yield (Mt/ha)	Area (000 ha)	Prod. (000 MT)	Yield (Mt/ha)	Area (000 ha)	Prod. (000 MT)	Yield (Mt/ha)
Telengana	0.0	0.0	0.0	0.0	0.0	0.0	122.7	1656.0	13.5
Andhra Pradesh	42.7	576.3	13.5	204.1	3061.1	15.0	98.6	1330.6	13.5
Maharashtra	107	535	5	99.0	245	2.5	95.0	712.5	7.5
Karnataka	3.6	65.9	18.3	2.9	50.6	17.4	2.1	13.5	15.1
Punjab	2.9	22.9	8	2.8	22.2	8.0	2.7	21.5	8
Other	5.5	31.7	5.8	14.4	141.1	9.8	13.9	134.0	9.6
Total	161.7	1231.9	7.6	322.2	3519.9	10.9	334.9	3886.2	11.6

Source: Director of Horticulture, 2015

1.3.1 Position of sweet orange in Maharashtra

Maharashtra is known as fruit bowl of India. There are different types/varieties of sweet orange cultivated in different regions of India, i.e. Jaffa, Valencia, Hamlin, and Malta in Punjab, Himachal Pradesh and Rajasthan. Sathgudi variety of sweet orange cultivated in Andhra Pradesh. Among that Nucelar variety of sweet orange is cultivated in Nagpur, Amravati, Aurangabad, Jalna, Dhule and Ahmednagar districts of Maharashtra.

Sweet orange is important fruit crop in Maharashtra. It is cultivated on an area of 95 thousand ha with a total production of 712.5 thousand MT and productivity of 7.5 MT/ha during 2013-14 (Director of Horticulture, 2015).

1.4 Position of sweet orange in Jalna district

Sweet orange is cultivated in Jalna district of Maharashtra State. Cultivated area under sweet orange was 11600

hectares with production of 1577.60 hundred MT during 2012-13 as shown in Table 1.4.

Table 1.4 Area, Production and Productivity of sweet orange in Jalna District

Year	Area (ha)	Production ('00'MT)	Productivity (q/ha)
2003-04	5707	438.75	76.88
2004-05	5707	525.39	92.06
2005-06	6317	645.91	102.25
2006-07	9264	1401.92	151.33
2007-08	8805	1194.22	135.63
2008-09	8805	805.04	91.43
2009-10	10640	1276.80	120.0
2010-11	11900	1190.00	100.0
2011-12	12000	1080.00	90.00
2012-13	11600	1577.60	136.00

Source : Directorate of Economics and Statistics, Govt. of Maharashtra, 2014

1.5 Objectives

The present research study has been undertaken with the following objectives in consideration with respect to sweet orange.

1. To estimate the growth rates in area, production and productivity,
2. To study resource use structure, costs and returns,
3. To estimate resource use productivity and resource use efficiency,
4. To study the marketing cost and
5. To identify the problems in production and marketing of sweet orange.

1.6 Scope and utility of the study

In order to understand the economics of production and marketing of sweet orange at farmer's level, its marketing management, the problems in production and marketing, it is imperative to have micro level analysis. This study was casted a sharp focus on the important factors closely associated with production economics, marketing channels and marketing cost all along with difficulties faced by the growers.

Though the study was conducted in a particular area i.e. Ambad and Badnapur tahsils of Jalna district of Maharashtra, it is hoped that the findings would be applicable to such other areas of Maharashtra , in particular and in other states in general, with similar conditions. The findings of the study would be of immense value to the planners, educators and policy makers. Similarly, the findings would be useful for other researchers in the field of agriculture and especially in the field of plantation fruit crops.

This is being a student's research, it implies limitations of resources. The findings are based on the expressed response of the farmers from their memory. Thus, the generalization of the findings on wider areas needs to be done cautiously.

1.7 Limitations of the study

As far as the limitations of the study considered, the study was based on sample survey of selected sweet orange growers from Ambad and Badnapur tahsils of Jalna district of Maharashtra. The information about cost and return was collected by survey method with the help of specially designed

schedules, about last year's cultivation and production practices from their own remembrance. So there may be some lacunae in the information given by the farmers.

As the study was conducted in a selected area, the results may not be applicable exactly to each area of sweet orange cultivation but it may helpful as a guideline for further studies.

2. REVIEW OF LITERATURE

The review of the research work on the related field helps in formulating the frame work of the study, deciding objectives and appropriate methodology to the situation under which research is to be carried out. The review of research work carried out in past on production and marketing of different fruit crops is presented in this chapter.

The present study envisages examining the economics of production and marketing of sweet orange in Jalna district of Maharashtra. Sweet orange is one of the major fruit crop, which is grown on sizable area of Ambad and Badnapur tahsils of Jalna district. Since the references are not available directly of sweet orange , the references related to other plantation and fruit crops are reviewed. The reviews collected are grouped into following categories.

- 2.1 Studies on growth rates in area, production and productivity
- 2.2 Studies on cost, returns, resource use productivities and efficiency
- 2.3 Studies on cost of marketing and
- 2.4 Studies on problems in production and marketing

2.1 Studies on growth rates in Area, Production and Productivity.

Handiganur (1995) studied “Economics of production and processing of grapes in Bijapur district, Karnataka”. He analyzed the growth rates of area, production and productivity of grapes in Bijapur district from 1978-79 to 1992-93. Growth rate

analysis had showed an increase of 7.12 per cent of area in Bijapur district. An increase of 0.6 per cent in area, 2.80 per cent in production and 2.0 per cent in productivity of grapes was observed in Karnataka state. The increase in production and productivity was due to the use of improved cultural practices, increased use of manures, fertilizers and plant protection.

More (1999) in his study, “Economics of production and marketing of banana in Maharashtra state”, analyzed the growth rate in area, production and productivity of banana in Nanded district, Parbhani district and Maharashtra state as a whole. In Nanded district, production growth rate had shown higher growth rate (21.04 per cent). The higher growth in production was contributed mainly by significant increase in area coupled with productivity. The growth rate of productivity was high (1.43 per cent) in Maharashtra state as a whole as compared to Nanded (1.40 per cent) and Parbhani (0.90 per cent) district. It was due to the use of improved cultural practices, higher use of manures and fertilizers, more use of other inputs and also increased yield levels in other districts of the state.

Varghese and Kumar (2004) in his study, “Trend analysis in area, production, productivity and price behavior of cardamom in Kerala”, worked out the trends in area, production and productivity of cardamom in Kerala for a period from 1970-71 to 2002-03 using semi-logarithmic growth equation. The area under cardamom registered a negative growth rate (-1.2 per cent) which was significant. The output showed an average annual

growth rate of 4.14 per cent and yield registered an average annual growth rate of 5.51 per cent.

Navadkar *et al.* (2004) studied the production, processing and trade of fruits and vegetables in Himachal Pradesh. At the end of 2000-2001, the world outputs of fruits and vegetable have crossed 4663 and 6981 lakh MT. The major area under fruit crops is located in the state of Maharashtra, A.P and Karnataka which together contribute nearly 35per cent of the national area. The productivity of fruit crops has also been increased from 10.00 MT/ha to 11.7 MT/ha. The area under fruits and vegetables in Himachal Pradesh increased by 3.1 and 1.5 per cent, whereas the production was increased by 2.6 and 4.4 per cent per annum.

Kareemulla *et al.* (2007) conducted a study on production and marketing of Indian Gooseberry – AONLA (*Emblica officinalis* Gaertn.) in Pratapgarh district of Uttar Pradesh. He reported that the area occupied by aonla based farming system grew at a growth rate of 4.02 per cent during the period 1995-2005. The production of aonla had increased from 47329 to 82690 tons. In the reference period at a growth rate of 5.2 per cent and the average productivity increased from 5.7 to 6.5 tons per ha.

Dongre (2014) studied economic analysis of production and marketing of sweet orange in Ahmednagar district of Maharashtra. He worked out the trends in area, production and productivity of sweet orange in Ahmednagar district of Maharashtra for a period from 2002 to 2012. The area

under sweet orange showed decreasing growth rate (0.05 per cent) which was non-significant. The output showed decreasing annual growth rate of 0.27 per cent which was non-significant and yield registered an average annual growth rate of 0.19 per cent which was significant.

2.2 Studies on Costs, Returns, Resource Use Productivities and Efficiency

Various studies on cost of cultivation and marketing of different fruit crops have been conducted in Maharashtra and India. The available literature having relevance to the present study have been reviewed as under.

Nighot *et al.* (1986) studied the economics of production of orange in selected villages of Nagpur district. They observed that, total cost of production including cost of establishment was ₹ 11,166.86 per hectare. Human labour, manure, fertilizer and pesticides were the important item of expenditure in orange production. Per hectare gross returns were ₹ 28,599.14. Per tree cost of production, gross and net returns were ₹ 33.63, ₹ 86.14 and ₹ 52.51, respectively.

Mahalle *et al.* (1987) worked out per hectare cost of establishment of Kagzi lime orchard. They selected a sample of 44 lime growers in Akola district of Maharashtra State. The results indicated that the per hectare quantities of key inputs utilized in establishing the lime orchard increased every year from first to sixth year. The per hectare total cost of establishment of lime orchard was worked out to ₹ 16,770.

Anonymous (1989) studied, “Production of Kagzi lime in Nagpur district”. The Kagzi lime cultivation was labour intensive and per hectare utilization of male labour (days) was 205.84 and per hectare use of N, P, K, was 43.76, 28.83 and 11.9 kgs, respectively. The average yield of Kagzi lime was 131.79 quintals per hectare. The total cost of production was ₹ 10,118.07 per hectare giving net return of ₹ 8,332.97 at cost C.

Raikar (1990) studied production and marketing of Cashew in Karnataka. The study revealed that the per hectare annual maintenance cost of cashew plantation was higher on small size (₹ 1674.17) plantation as compared to large size plantation (₹ 1303.65).

Dayanand (1993) studied the investment for establishment of ber orchard in Karnataka. He observed that the average establishment cost of one hectare of ber orchard was ₹ 97,415 and ₹ 97,875 in large (more than 6 ha) and small (less than 6 ha) size orchards, respectively. Recurring and maintenance cost during gestation period was ₹ 50,189 in large size orchard while, it was ₹ 49,659 in small size orchard. Per hectare cost of cultivation during bearing period was ₹ 28,224 in large and ₹ 27,816 in small size orchard.

Koujalagi and Kunnal (1995) conducted study on resource use efficiency in pomegranate production. For study they were selected 70 samples from Bagalkot tahsil of Bijapur district of Karnataka. They used Cobb Douglas production function for analysis. The regression coefficient for land, labour, manures and fertilizer were highly significant. The coefficient of

multiple determinations (R^2) was 0.6956. This indicated that the variable included in the function explained about 70 per cent of the variation in the gross returns from the orchards.

Anonymous (1997) worked out the economics of cultivation of Pomegranate in western Maharashtra. The data were collected from the districts namely Solapur, Nashik and Ahmednagar. Establishment cost worked out to ₹ 61,815.94 of which the important items of cost were expenses on total human labour (26.21 per cent), crop protection (11.35 per cent), fertilizers (7.23 per cent) and manures (5.37 per cent). The cost of cultivation at overall level worked out to ₹ 55,046.63 in which share of cost 'A' and cost 'B' was 49.28 and 46.03 per cent respectively. The major items of direct cost were total human labour (15.66 per cent) followed by establishment cost (7.33 per cent), fertilizer (6.13 per cent), Crop protection (5.86 per cent), interest on working capital (5.14 per cent) and manure (4.40 per cent). The overall productivity per hectare was 93.60 quintal and per quintal cost of cultivation was ₹ 587.67.

Bansode (2001) studied on economics of production of fig in Aurangabad district of Maharashtra. He analyzed that the mean use of male labour days were 58 days per hectare as against 98 days for the female. The MVP (marginal value product) for the male labour use was ₹ 1001.5 as against marginal cost of ₹ 50. The MVP of female labour use was ₹ 376.3 as against the marginal cost of ₹ 25 per day. The MVP for use of N was ₹ 44.44 against the expenditure of ₹ 9.56 per kg. Thus, it can be concluded that the use of male and female labour and

nitrogen can substantially increased to achieve desirable level of production by increasing the average consumption of these variables considerably low as compared to recommended.

Gupta and Prashant (2004) analyzed the constraints in cashew nut production and marketing. They reported that lack of money and essential experiments needed for cashew nut production was a big constraint. About 91 per cent producers were facing this problem. Other important constraints were the lack of soil testing facilities from which about 90 per cent cashew nut growers were affected.

Anonymous (2005) conducted a study on economics of production and marketing of fig in Pune district. He analyzed the data of 90 fig cultivators particularly in Purandar tahsil. The study revealed that, per hectare cost of cultivation i.e. total cost indicated positive relationship as the size group increases the total cost also increases. At the overall level per hectare total returns, total cost and net profit realized were ₹ 3,65,254.03, ₹ 1,26,896.68, ₹ 2,38,357.35, respectively with 2.88 B : C ratio. The major items of cost of cultivation were rental value of land, plant protection, family human labour, manures and hired human labour.

Gangawar *et al.* (2005) studied economic evaluation of Kinnow mandarin cultivation in Punjab. They estimated the return and economic feasibility of investment in orchards, cost and return from Kinnow Mandarins. The internal rate of return (IRR) varies from 22.41 to 25.65 per cent, depending upon the size of orchards. The total establishment cost of orchard was

₹ 1,19,107. The average gross returns per ha amounted ₹ 73,672 per year.

Jadhav (2007) studied the economics of production and marketing of custard apple in Solapur district. The per hectare cost of establishment was ₹ 34,319.13 in large size group followed by ₹ 34,290.03 in medium size group and ₹ 33,272.09 in small size group. The major items of cost were cost on account of rental value of land, manures and fertilizers. Regarding cost of cultivation of custard apple, cost 'A' was maximum in the case of large size group (₹ 27,579.95) followed by medium size group (₹ 25,800.00) and small size group (₹ 24,050.65). The manures, fertilizers, hired human labours and family labours were the major items of cost 'C'. Average yield obtained per hectare was 89.08 quintals with gross income of ₹ 1,28,273.79. The net income at the overall level was ₹ 72,296.71 per hectare with output- input ratio of 2.29.

Anonymous (2007) studied economics of production and marketing of custard apple in Solapur district for the year 2006 and 2007. They found that per hectare cost of cultivation was ₹ 41,533.20 for the year 2005-06 and ₹ 48,876.90 for the year 2006-07. This was because of more use of resources during the year 2006-07 which increased in cost of cultivation for the year 2006-07 as compared to 2005-06.

Sonawane (2008) studied economics of production and marketing of pomegranate in Satana tahsil of Nashik district. The study revealed that, the per hectare establishment cost was ₹ 151511.15 and the annualized cost was

₹ 10,096.70. The establishment cost decreased as the size of holdings increased. The expenses were incurred more on plant protection and the total cost of cultivation was ₹ 1,95,826.14.

Mahakalkar (2010) studied the cost of cultivation of oranges for the sample as a whole was ₹ 1,01,619.89 per hectare. The cost 'A' was ₹ 60,577.19 (59.61 per cent) per hectare. Per hectare average net return for the sample as a whole was ₹ 1,20,705.91. The highest net income was obtained for orchard age group 11-15 year (₹ 1,56,593.34). Output-input ratio at the total cost was 2.19 for the sample as whole. Highest output-input ratio was obtained from the orchard age group of 11-15 year i.e. 2.44. Producers share in consumer's rupee was higher in channel II – (producer – wholesaler – retailer) in Katol and Narkhed market. It was 92.06 per cent and 91.87 per cent, respectively.

Kalamkar (2012) studied economics of production and marketing of sweet orange in Nagpur district. The study revealed that the per hectare cost of establishment of sweet orange on an overall basis was ₹ 70,490.23. Human labour accounted highest share i.e. 41.86 per cent. Cost of cultivation of sweet orange for the sample as a whole was ₹ 79,532 per hectare. Total yield was obtained as 103.14 qtls and its cost was ₹ 1,90,275.76. Per hectare average net return for the sample as a whole was ₹ 96,928.21 with output - input ratio as 2.58. It was observed from the study that, the per hectare cost of cultivation of orange crop was decreases with increase in the age of garden.

Dongre (2014) studied economic analysis of production and marketing of sweet orange in Ahmednagar

district of Maharashtra. The study revealed that the per hectare cost of establishment of sweet orange on an overall basis was ₹ 1,39,679.56. Human labour accounted highest share i.e. 24.18 per cent. Cost of cultivation of sweet orange for the sample as a whole was ₹ 200077.21 per hectare .Total yield was obtained 112.73 qtls. and its cost was ₹ 361276.26. Per hectare average net return for the sample as a whole was ₹ 201700.33 and output - input ratio was 2.27. It was observed from the study that, the per hectare cost of cultivation of orange crop was decreases with increase in the age of garden.

2.3 Studies on cost of marketing

The studies on cost of marketing, market margins and price spread of various fruit crops conducted in the state of Maharashtra and India having relevance to the present study have been reviewed and presented in the subsequent paragraphs.

Deshpande and Autkar (1988) studied the marketing of Nagpur mandarian in Akola district of Maharashtra and found that overall average cost of marketing of Nagpur mandarian was ₹ 17.47 per quintal. Considering the elements of marketing cost, share of middlemen was major component consisting 35.11 per cent, followed by transportation cost (32.41per cent) of the total marketing cost. Producer- Pre harvest contractor- wholesaler-retailer- consumer was the biggest channel of distribution and the producers share was worked out to 31.40 per cent.

Bhole *et al.* (1992) conducted study on price spread in marketing of oranges in Amravati and Nagpur district. A sample

of 60 orange growers and 10 pre-harvester contractors from each district were selected for study. They found that producers get 32 per cent higher price in APMC market as against selling their produce to pre harvest contractor. They also found producer's share was 48 per cent in APMC market. From this it is inferred that the selling of produce in APMC market is more economical.

Changole (1995) studied the marketing of fruits in APMC market, Amravati. He selected the APMC market Amravati because it was one of the important markets in Vidarbha. The fruits like apple, mango, orange and sweet orange were selected for the study as they have noticeable arrivals and spread price in Amravati market. He observed the marketing channels for orange as, Producer-Wholesaler-Retailer-Consumer. Producer – Wholesaler of APMC-Wholesaler of distant Market-Retailer-Consumer. The producer's share in consumer's rupees in case of first channel was 48 per cent while in case of second channel the same was 31 per cent. His study further reveals that, in the middle of Ambia bahar and Mrug bahar season arrivals were lower while the prices were highest toward the end of season.

Dangore (1996) studied that the marketing channel of orange marketing in Katol and identified four marketing channels which were prevailing in study area that is,

1. Producer–Pre-harvest contractor–Wholesaler–Retailer in local market-Consumer in local market.
2. Producer–Wholesaler–Retailer in local market-Consumer in local market.

3. Producer–Wholesaler–Selling agent at destination–Retailer at destination –Consumer at destination.
4. Producer–Selling agent at destination–Retailer at destination– Consumer at destination.

It was estimated that, the net price per 1000 fruits received to farmers was higher by ₹ 92.05 in respect of post-harvest as compared to pre harvest sale. In pre harvest sale, net price received by farmers in contract method was higher by ₹ 5.27 than net price received by farmer in count basis method. In post-harvest method of sale, the farmer got highest net price of ₹ 515.91 which was received through box consignment at distant consuming market and then ₹ 273.68 by selling in A.P.M.C. Out of total sale the proportion of quantity of fruits sold through channel I worked out to 72.82 per cent whereas, through II and III channel 18.67 per cent and through IV channel 8.51 per cent. At farmer level in local market and long distant market through box and loose consignment the total market cost worked out to ₹ 64.25, ₹ 438.63 and ₹ 304.28 per thousand fruits respectively. The net price received by orange growers was more i.e. ₹ 274 per thousand fruits in channel II as compared to ₹ 195 in channel I. The market margin of ₹ 152.24 per thousand fruits out of which ₹ 57.76 was market cost and remaining ₹ 94.48 as profit margin.

Adaskar (1998) made economic analysis of marketing of Kagzi lime in Akola district. He estimated net establishment cost of orchard was ₹ 5,233 per hectare and cost of production of Kagzi lime was ₹ 28,148.43 per hectare. The cost (A) constitute

57.09 per cent of the total cost. The production was 124.48 quintal with gross return to the extent of ₹ 65,352.05. Net return at cost (C) was ₹ 37,203.62. The yield and gross return per tree was 33.41 kgs and ₹ 175.37 respectively. Net return per tree at cost (C) was estimated at ₹ 52.13. The cost (A) that is direct expenses incurred by the cultivar on overall basis worked out to ₹ 50.49 per tree and this can be taken as guideline. For financing to the cultivation based on number of trees. The total marketing cost ₹ Per 1000 fruits incurred by producers, wholesalers and retailer were worked to ₹ 69.90, ₹ 43.20 and ₹ 85.25, respectively. Producer's share in consumer's rupee was worked out to 52.77 per cent. Net margin of retailers was 24.09 per cent in consumer's share.

Anonymous (2000) studied the marketing of oranges in Vidharbha region. The study was based on a sample of 60 oranges growers and 55 market intermediaries selected from Amravati and Nagpur district. Observed the marketing channels as follows *viz.*,

- I. Producer - Pre harvest Contractor - Local Wholesaler - Local Retailer- Local Consumer
- II. Producer - Local Wholesaler - Local Retailer - Local Consumer.
- III. Producer - Pre harvest Contractor - Wholesaler of distant market - Retailer of distant market - Consumer
- IV. Producer - Local Wholesaler - Wholesaler of distant market - Retailer of distant market - Consumer

V. Producer - Wholesaler of distant market - Retailer in distant market - Consumer.

The producer's share in consumer's rupee was estimated as 37.26 per cent in channel I while it was 41.25 per cent in channel II. In channel III it was 29.93 per cent. In channel IV producers share estimated by research worker was 33.14 per cent while the marketing cost incurred was 5.11 per cent. In case of channel V producer's share was up to 50 per cent while the marketing cost incurred by producer was 34.24 per cent.

Ladaniya and Wanjari (2003) investigated the marketing pattern of sweet orange in selected districts of Maharashtra. They observed five different channels of marketing as i) Farmer – Pre harvest contractor – Commission agent (local market) – Retailer – Consumer; ii) Farmer – Commission agent (distant market) – Wholesaler – Retailer – Consumer; iii) Farmer – Pre harvest contractor – Commission agent (Nagpur market) – Retailer – Consumer; iv) Farmer – Pre harvest contractor – Commission agent (Nagpur market) – Buyer of distant market (at Nagpur) – Wholesaler – Retailer – Consumer and v) Farmer – agent – Pre harvest contractor – Commission agent (at distant market) – Retailer – Consumer. They concluded that the producer's share in consumer's price was 49.42 per cent, while, in a channel where pre harvest contractor was involved; the producer's share was only 30 per cent. At Nagpur and Aurangabad markets, share of retailer was 51.10 and 51.60 per cent, respectively in price paid by consumers.

Latpate (2004) studied production and marketing of sweet orange in Ahmednagar district. He worked out the per ha cost of production and it was ₹ 90350.69 with 1.50 B:C ratio. Three marketing channels were observed i.e. 1) Producer-Retailer (local) – Consumer, 2) Producer – pre harvest contractor – wholesaler – retailer – consumer, and 3) producer – wholesaler – retailer – consumer. Total marketing cost observed in Pune market was ₹ 287.32 and it was ₹ 149.48 in Ahmednagar market.

Murty *et al.* (2009) studied the different channels in the marketing of fruits. They estimated marketing cost of mango which ranges from ₹ 2,944 per tones to ₹ 5,664 in pomegranate. The cost of marketing in banana and grapes worked out to ₹ 4,360 per tones and ₹ 4,630 per tones, respectively. The farmer or pre-harvest contractor incurred highest marketing cost which contributes more than 50 per cent of total marketing cost. The mango, grape, banana and pomegranate accounted nearly 16.82, 23.15, 27.52 and 29.98 per cent respectively of consumer's price which indicates that, substantial amount was spent on marketing. They also estimated farmer's net margin in the consumer's price was as low as 46 per cent in mango to as high as 68 per cent in grapes. Share of market intermediaries in the consumer's price was 9 per cent. Similarly price spread was ₹ 6,400 per tones and major component was marketing cost (72 per cent) followed by the intermediaries margin (28 per cent).

Pandey (2011) studied marketing of sweet orange in Almora district of Kumaon region (Uttarakhand). Primary data

was collected from various stakeholders constituting forty growers and five intermediaries operating at each level of marketing channels. Six distribution channels were identified. More than 57 per cent of the produce was sold directly to the village trader. Marketing cost varied from ₹ 278 per quintal to ₹ 894.16 per quintal in channel I. A major component of the marketing cost of the producer was cost incurred on mules (₹ 150 per quintal). The producers were earning 100 per cent margin in channel I and channel II. The producer's share in consumer's rupee was 9.38 per cent and 8.60 per cent in channel II and I, respectively. Channel IV was the most efficient channel with efficiency of 1.27. Channel VI was least efficient (1.00). The producers were getting only 9 per cent of the consumer's price. The spatial price difference between the local market and distant market is very wide i.e. more than ₹ 2000 per quintal. The main component of cost of producers was the labour cost and transportation cost borne by producers.

Kalamkar (2012) in his study "economics of production and marketing of sweet orange in Nagpur district." Observed two marketing channel, Channel I: Producer → Pre-harvest contractor → Wholesaler → Retailer → Consumer and Channel II: Producer → Wholesaler → Retailer → Consumer. Producers' share in consumer's rupee was highest in channel (I) i.e. 40.44 per cent. While in channel (II) it was 21.52 per cent.

2.4 Studies on Problems in Production and Marketing

Deodhar and Pandit (2002) studied the different problems faced by mango cultivators in their study on quality

issues in supply chain- a case of Kesar mango at Saurashtra region. They concluded that the major problem faced by the farmers was absence of cold storage facilities, unavailability of quality packaging material, absence of perfect market and standardization of grades.

Kamble *et al.* (2005) studied the constraints in the production and marketing of grapes in Sangli district. They have selected fifteen villages (eight from Tasgaon and seven from Miraj tahsil of Sangli district of Maharashtra) and about ninety grape cultivators were selected for study. The study has been identified the marketing problems as high commission charges (44 per cent), high cost of transportation (44 per cent), high cost of packing (10 per cent) and low net returns. Besides this the, lack of pre-cooling and cold storage facilities and longer chain of intermediaries were the major problem in marketing. The study has been suggested that, the number of market intermediaries should be reduced through establishment of co-operative marketing. In addition state government should enact the policy on grape marketing similar to that adopted by government of Andhra Pradesh, *viz.*, provision of stalls to cultivators in the urban market.

Hadawale (2005) studied the production and marketing management of grapes in Junnar tahsils of Pune district. She reported that the farmers were facing the problems such as high cost of input, high interest rates, lack of skilled labours, decreasing productivity, lack of knowledge of INM and high cost of machinery in production while high rate of commission

charges. no guarantee of market price, lack of infrastructure facilities and lack of marketing intelligence etc. were observed major problems faced by grape growers in marketing of grapes.

Jadhav (2007) conducted the study on economics of production and marketing of custard apple in Solapur district. He concluded that the major problems faced by farmers in study area *viz.*, non availability of quality planting material, high cost of fertilizers, high wage rates etc. While in case of marketing non return of packing material, high commission charges, high cost of transport and lack of market information, etc. were the major problems.

Manjula *et al.* (2011) conducted the study on marketing of fruits surrounding area of Bijapur district of Karnataka state. They revealed that the majority of the farmers expressed that bacterial blight has affected the area (88.33 per cent), insecticide and fungicide (81.66 per cent) and liquid fertilizers (76.66 per cent) are costly and timely supply of electricity (65 per cent) were the problems coming in the way of production to greater extent. In case of marketing of fruits high transportation cost (78.33 per cent), no guaranteed marketing (65 per cent) and high rate of commission (48.33 per cent) were the greater extent problems faced by the pomegranate farmers.

The above reviews indicted several problems mostly concerning to market infrastructure, market functioning and market organization in fruit marketing. These problems have to be tackled effectively in order to bring both operational and economic efficiency in marketing of fruits.

3. METHODOLOGY

The present study is undertaken with the aim to study the economics of production and marketing of sweet orange in Jalana district of Maharashtra. The object of any scientific investigation is to draw the useful conclusions in the light of objective of the study. In order to arrive the meaningful conclusions it is essential for the investigator to adopt appropriate method and procedure. Keeping this in view, this chapter has been devoted to explain the methodology adopted, to fulfill the objectives of the study.

3.1 Selection of the study area

Jalna district in Maharashtra is one of the major sweet orange growing areas. The cultivation of this crop is concentrated in Ambad and Badnapur tahsils of the district. Therefore, these tahsils were purposively selected for the study.

3.2 Selection of villages

Three villages from each tahsil were selected on the basis of maximum area under sweet orange. Thus, in all 6 villages were selected from these tahsils. The details are given in Table 3.1

Table 3.1 Tahsil wise selected villages.

Sr. No.	Tahsil	Villages
1	Ambad	Kingaonwadi, Rewalgaon and Badhapur
2	Badnapur	Saygaon, Bajar wahegaon and Dhoksal

3.3 Selection of Sweet Orange Cultivators

The list of cultivators having sweet orange orchards from these villages was arranged in ascending order. The cultivator was categorized into three groups on the basis of the actual area under sweet orange orchard.

- i. Group I: Cultivators having area under sweet orange from 0.01 to 0.20 ha.
- ii. Group II : Cultivators having area under sweet orange from 0.21 to 0.40 ha and
- iii. Group III: Cultivators having area under sweet orange from 0.41 ha and above.

30 sample cultivators from each of these groups (Table 3.2) were selected. 15 cultivators were selected from each village. Thus, in all 90 sample cultivators was selected randomly from all the categories.

Table 3.2. Distribution of selected sweet orange growers in different groups

Sr. No.	Size Group	No. of sample
1	Group I (Small)	30
2	Group II (Medium)	30
3	Group III (Large)	30
	Total	90

3.4 Method of collection of data

The primary data relating to production aspects (the costs and returns) of sweet orange, marketing of sweet orange and problems in marketing of sweet orange etc. were collected by

survey method for the year 2014-15 with the help of specially designed schedules. The data were collected by conducting personal interviews with the sample growers.

The data were also collected from pre-harvest contractors, wholesalers and retailers with the help of specially designed questionnaire.

3.5 Cost concepts and evaluation of items of cost

The cost of establishment of sweet orange orchard and Cost of production of sweet orange were studied by using the cost concepts *viz.*, cost 'A', cost 'B' and cost C . The sweet orange once established, one can harvest sweet orange every year. The production activity can be continued for about 20 years. However, standard life of sweet orange garden was considered as 15 years.

The establishment cost was amortised by using following formula

$$a = \frac{[A (r+1)]^n}{(r + 1)^{n-1}}$$

Where,

a : Amortised cost

A : Cost 'C'

r : Rate of Interest

n : The economic life of sweet orange (years)

The economic life was considered as 15 years and rate of interest 6 per cent per year.

3.5.1 Cost 'A'

It includes the cost on account of human labour, total bullock pair charges, total machinery labour charges, cost of seedlings, cost of manures and fertilizers, insecticides and pesticides, cost of supporting structure, irrigation charges, depreciation on implements and farm buildings, land revenues, cesses and other taxes as well as interest on working capital, incidental charges, ect.

3.5.2 Cost 'B'

Comprises of cost 'A' plus imputed rental value of owned land and imputed interest on fixed capital .

3.5.3 Cost 'C'

Comprises of cost 'B' plus imputed value of family labour.

A. Human labour

It includes both hired and family labour. Most of the labour force engaged in sweet orange production was hired. However, the cultivators have to engage his own family members from time to time for certain operations like spraying, irrigation etc. through out the year. Human labour cost comprises of -

- a. Wages actually paid to hired labour
- b. Imputed value of labour put in by the family members
- c. Wages paid to attach farm labours for different operations have been included in the hired labour. The actual wages paid to the casual labour were considered and wages of male and female members of the family members were calculated on the basis of existing wage rates of the hired

casual labours in force from time to time for different operations.

B. Irrigation charges

Irrigation was through well and lift. The amount spent on the maintenance of electric motor for irrigating the crop, the depreciation and the hours of electric motor use were considered for estimating the irrigation charges in case of well irrigation. In case of lift irrigation, the actual irrigation charges paid by the cultivators were taken into account.

C. Land revenues, cesses and taxes

This cost included land revenue and other relevant taxes and cesses which were actually paid by the cultivators.

D. Depreciation on implements, machinery and farm buildings

Farm assets like implements and farm buildings were evaluated at the prevailing market prices taking into consideration the condition of the assets. Depreciation of these assets for the current year was calculated using straight line method for which the present value and the remaining useful life of asset was considered.

E. Interest on working capital

Interest on working capital was charged at the rate of 6 per cent per annum. Working capital includes cash or kind expenses incurred during the period of cultivation.

F. Bullock pair charges

Bullock pair cost was calculated by considering the actual hired charges paid by the farmers or the prevailing rates

for bullock pairs for different operations were taken into consideration.

G. Machine labour

In case of owned machines, cost was evaluated on the basis of hired charges prevailed in the village and in the case of hired machines as per the actual amount paid.

H. Seedlings

In case of the seedlings purchased from the other cultivators or from nursery, the actual price paid was ascertained and charged.

I. Manure

The cost of farm yard manure (FYM) or compost produced on the farm was evaluated at the rates prevailed in the village. The cost on account of manures purchased was accounted as the actual price paid by the cultivators.

J. Fertilizer

The fertilizer was evaluated at the actual price paid by farmers.

K. Insecticides and pesticides

The insecticides and pesticides expenses were considered at the actual price paid by the cultivators.

L. Interest on fixed capital

Interest on present value of fixed assets such as farm building, implements and machinery, irrigation structure and equipments and livestock was charged at the rate of 10 per cent.

M. Rental value of land

This cost includes the estimated rental value of owned land. It was evaluated at the rate of 1/6 of the value of gross output minus the land revenue.

3.6 Analysis of data

The data collected from the sample cultivators and other market intermediaries from selected tahsils were analysed to obtain estimates of the establishment cost, production and marketing cost etc. of the sweet orange.

The trend in area, production and productivity was estimated by using following formulae:

$$Y=ab^t$$

Where,

Y = Area, Production and Productivity

b = Trend coefficient

a = Intercept

t = Time variable

The Compound Growth Rate (CGR) of the trends in area, production and productivity was estimated by using the following formula:

$$CGR = (\text{Antilog } b - 1) \times 100$$

The standard cost concept viz; Cost A, Cost B and Cost C was used. The simple statistical tools viz; percentages, averages was used.

To estimate the resource use productivity, Cobb-Douglas production function of the following type was used.

$$Y = a X_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} X_5^{b_5} X_6^{b_6} X_7^{b_7} X_8^{b_8} e^u$$

Where,

Y = Dependent variable (Output in qtl)

X₁ = Human Labour (man days)

X₂ = Bullock Labour (pair days)

X₃ = Manure (qtl)

X₄ = N (kg)

X₅ = P (kg)

X₆ = K (kg)

X₇ = Irrigation charges (₹)

X₈ = Plant Protection charges (₹)

b_i's = Regression Coefficients.

a = Constant.

e^u = Error term.

To estimate the resource use efficiency, the following formula was used.

$$MVP = (b_i \frac{\bar{Y}}{\bar{X}_i}) P_y$$

Where,

b_i = Production elasticity corresponding to the ith input

$\bar{Y}$ = Geometric mean of output

$\bar{X}_i$ = Geometric mean of ith input

P_y = Price per unit of output

4. RESULTS AND DISCUSSION

PART-I

GEO SOCIO-ECONOMIC INFORMATION OF THE STUDY AREA

4.1 General

Jalna was formerly a part of Nizam State and after the *Marathwada Mukti Sangram*, became part of India, as a tahsil of Aurangabad district.

Jalna district erstwhile a part of Aurangabad district came into existence on 1st May, 1981 by carving out Jalna, Bhokardan, Jafrabad, Ambad tahsils of Aurangabad district and Partur tahsil of Parbhani district. Jalna district covers an area of 7,612 sq.kms, which is 2.47 per cent of the total state area.

4.2 Location

Jalna district is approximately situated at the center part of Maharashtra state of Republic of India and in northern direction of Marathwada region. Specifically district lies between 19°1' north to 21°3' North Latitudes and 75°4' East to 76°4' East Longitude.

4.3 Boundaries

The boundaries of Jalna district are adjacent to Parbhani and Buldhana on east, Aurangabad on west, Jalgaon on north and Beed on south (Fig 1).

4.4 Topography

Jalna district is situated in the upper Godavari Basin. The central hill range known as Jalna Hill is an upland plateau and is drained by Purna river and its tributaries. Southern portion is comparatively low land, flat area terminating at Bank

of *Godavari* river in the South. District slopes towards south and average elevation above sea level is 534 meters.

4.5 Climate

The climate of the district can be divided into three seasons as: a) Moderately warm-wet season during June to September, b) Cool dry season from October to February, and c) Hot dry season from March to May. The average temperature of the district ranges from 20°C during winter to 41°C during summer. During greater part of the year, the climate is quite pleasant.

4.6 Soil

The soils of the district are black with considerable variation in texture and depth. They are light, medium and heavy soils. The soils along the river banks especially in Ambad and Partur blocks are deep black and quite fertile. The soils in northern parts of the district, i.e. in Jalna, Bhokardan and Jaffrabad blocks are coarser.

4.7 Rivers and irrigation status

The most important river in Jalna district is Godavari, which flows for about 60 kms along the Southern boundry of the district. Its principal tributaries are Dudhana, which flows from central part of the district and Galhati, which passes through Ambad tehsil. The river Purna, which is one of the tributaries of Godavari flows through the Northern part of the district. The other tributaries of Purna and Khelna are Girija and Dudhana respectively.

Water is one of the important resources for the development of agriculture. There is no major irrigation project in Jalna district. However, an area of about 51710 hectares in Jalna district is being irrigated by Jayakwadi project which is one of the major irrigation project situated in Paithan taluka of Aurangabad district. There are 7 medium irrigation projects and 46 minor irrigation projects in Jalna district. However, there is shortage of water during summer season.

4.8 Rainfall

The district receives rainfall mostly from South-West monsoon. Rainfall is not uniform in all parts of the district. The average rainfall ranges between 600 to 700 mm.

4.9 Population

Table 4.I.1 revealed that the population of Jalna district. Total population of the district as per the 2011 census is 1958 thousand. The male population is 1011 thousand. The female population is 947 thousand. The density of population per sq.km is 254 and the sex ratio is 937. Total literacy rate 71.52 per cent, in which male literacy rate is 81.50 per cent and female literacy rate is 60.95 per cent.

Table 4.I.1. Population as per census (In thousands)

Sr. No.	Particular	1990-91	2000-01	2011-12
1	Total	1364	1612	1958
2	Males	697	826	1011
3	Females	668	786	947
4	Rural	1134	1304	1581
5	Urban	230	308	377

Table 4.I.1. contd...

Sr. No.	Particular	1990-91	2000-01	2011-12
6	Decadal growth rate of population	21.05	21.78	21.84
7	Density (population.)	179	209	254
8	Literacy rate (in %)			
	Total	46.25	64.52	71.52
	Males	64.43	79.17	81.50
	Females	27.3	49.25	60.95
9	Percentage of Urban population	16.86	19.11	19.25
10	Sex ratio(females per thousand males)	958	952	937

Source:-District Statistical Abstract, 2012-13

4.10 Land use pattern of Jalna district

Table 4.I.2 reveals that the land use pattern of jalna district. Total reported area for land utilization of Jalna district for the year 2012-13 is 773 thousand ha. Out of which area under forest is 6 thousand ha. and Uncultivable land is 71 thousand ha. Net area sown is 611 thousand ha.

Table 4.I.2 Land use pattern of Jalna district, 2012-13

Sr. No.	Particulars	Area ('000' ha)	Percentage to the total
1	Total geographical area	773	100
2	Area under forest	6	0.77
3	Area not available for cultivation		
	A) Land put to non-Agril. uses	56	7.24
	B)Barren and uncultivable land	15	1.94
	Total	71	9.18
4	Other uncultivable land excluding fallow land	8	1.04
5	Fallow land	28	3.62
6	Net area sown	611	79.04

Source: Socio-Economic Survey of Jalna district, 2012-13.

4.11 Cropping pattern

Cropping pattern of the district is dominated by cotton, cereals, pulses and oilseed crops. The proportion of total cereals in Jalna district is 29.64 per cent, total pulses 14.07 per cent, total food grains 43.71 and total oilseed 1.23 per cent respectively to total cropped area for the year 2012-13.

4.12 Livestock

Livestock is an integral part of agriculture and consists of cattle, buffaloes, sheep, goat, pigs, and poultry.

The number of total livestock population of the district is 11,96,506 out of which cattle population is 407478, buffaloes 87684, sheep 27034, goats 224636 and total poultry is 449674 (Livestock census 2007).

4.13 Co-operation

Co-operative sector covers aspects of agricultural needs such as extension of agricultural credit and provision of agricultural input through co-operative societies. In Jalna district, there are 569 primary agriculture credit co-operative societies, 260 co-operative milk societies, 4 sugar factories and 4 ginning factories (District Statistical Abstract, 2012-13).

4.14 Infrastructure

4.14.1 Transport

4.14.1a Railways

The total length of railway line passing through the district is only 88 kms. Manmad to Kachikuda railway line passes through Jalna district. Jalna and Partur, two blocks of the district, only are linked up with the meter gauge line. Jalna

district is not well connected with the other major cities and hence industrialists as well as the traders are facing the problem of transportation of goods. Aurangabad to Jalna as well as Jalna to Parbhani railway line had been converted into broad gauge line which is very much useful to the local industrialists and businessmen.

4.14.1b Roads

The district is having a total road length of 3559 kms as on December 2014. The city is connected with major cities in Maharashtra as well as other business and industrial centers in and outside the state. The length of National Highway passes through the Jalna district is only 22 km. The total road length of the district per one lakh population comes to 278.43 km whereas it is 242 km for the Maharashtra State. Jalna district has good potentiality of transportation.

4.14.1c Air transport

At present, there is no air transport facility available in the district. However, Aurangabad Airport, which is 67 km. away from Jalna serves the needs of the industrialists and traders.

4.14.2 Communication

Communication facilities like fax, Telephone, E-mail, internet, telex etc., are pre-requisite for development of industry in any area. Information can be transmitted from place to another, within a short period of time with the help of this new communication aids. There are 106 Post offices, 11 Telegraph offices and 67 telephone exchanges in Jalna district. The district

has 16072 telephones. All talukas, district headquarters and important places are connected by telephones. Another 12 telephone exchanges are proposed to be set up in Jalna district (District Statistical Abstract, 2012-13).

4.15 APMCs

There are 08 APMCs in the Jalna district, one at each taluka place. The detail information about average annual arrivals and average annual value of produce sold are presented in the Table 4.I.3. There are 21 sub yards of these APMCs.

Table 4.I.3 The APMCs in Jalna district and their arrivals

Sr No.	Name of APMC	Average Annual Arrivals of last 5 years (2006 to 2011) in (00' MT)	Average Annual Value of produce sold within last 5 years (2005 to 2011) in (₹Lakhs)
1	Jalna	69880	104130
2	Ambad	1012	2651
3	Bhokardan	4045	3817
4	Mantha	1116	2601
5	Jafrabad	223	207
6	Partur	7396	17838
7	Ashti	1668	1016
8	Ghansawangi	7002	17080
	Toal	92342	149340

Source-District Statistical Abstract, 2012-13

Part II

Fruit cultivation is usually taken up by the skilled farmers who have an experience and management ability of utilizing the production resources rationally. For sweet orange crop, lot of personal attention and after care is required, like other horticultural plantations, sweet orange involve a sizeable amount of expenditure on fixed costs. The farmer has to suffer the loss of raising alternative crop; however this can be met to some extent by having some intercropping during first five years. The income from sweet orange starts from fifth year onwards.

In this chapter, an attempt has been made to study the socio-economic aspects, land holding and cropping pattern of sweet orange growers, the cost of cultivation, the cost of establishment of sweet orange orchard, gross income, net profits, production and disposal pattern of sweet orange, grade wise quantity of sweet orange produced, marketing channels, marketing costs, and problems in production and marketing of sweet orange.

4.1 Family size and its composition

The study of family size and its composition is important to get an idea about labour force available for farm operation from the family. The details includes number of male, female and children are presented in Table 4.1.

Information presented in table revealed that the average size of family in small group was 4.40 members of which

average male, female and children were 24.32 per cent, 23.41 per cent and 52.27 per cent, respectively.

Table 4.1 Family size and its composition

(Per farm)

Sr. No.	Particulars	Size group			
		Small	Medium	Large	Overall
1	Male	1.07 (24.32)	1.83 (34.33)	2.00 (34.31)	1.64 (31.60)
2	Female	1.03 (23.41)	1.37 (25.71)	1.63 (27.96)	1.34 (25.82)
3	Children	2.30 (52.27)	2.13 (39.96)	2.20 (37.73)	2.21 (42.58)
	Total	4.40 (100)	5.33 (100)	5.83 (100)	5.19 (100)

(Figures in parentheses are the percentage to the respective total)

There were 5.33 members in medium size group of which male, female and children were 34.33, 25.71 and 39.96 per cent, respectively. In large size group the average number of family member were 5.83 of which male, female and children were 34.31, 27.96 and 37.73 per cent, respectively. At overall level, average size of family was 5.19 of which 31.60, 25.82 and 42.58 per cent were male, female and children's, respectively. From this table it is concluded, that average size of family of selected sweet orange growers was 5.19 family members.

4.2 Education status of selected farmers

Education is another important factor influencing managerial ability and technical knowledge of the farmers. It was noticed that in small size group, 52.27 per cent family members were having education upto degree level.

33.41 per cent family members were having secondary education, 12.05 per cent family members were having upto primary education and 2.27 per cent family members were illiterate.

Table 4.2 Education status of selected farmer

(Per farm)

Sr. No.	Particulars	Size group			
		Small	Medium	Large	Overall
1	Illiterate	0.10 (2.27)	0.30 (5.63)	0.27 (4.63)	0.22 (4.24)
2	Upto Primary (1 st to 4 th std.)	0.53 (12.05)	0.60 (11.25)	0.90 (15.44)	0.68 (13.11)
3	Upto Secondary (5 th to 7 th std.)	1.47 (33.41)	2.00 (37.53)	1.97 (33.79)	1.81 (34.87)
4	Upto degree	2.30 (52.27)	2.43 (45.59)	2.69 (46.14)	2.48 (47.78)
	Total	4.40 (100)	5.33 (100)	5.83 (100)	5.19 (100)

(Figures in parentheses are the percentage to the respective total)

In medium size group, 45.59 per cent family members were having education upto degree level.

37.53 per cent family members were having secondary education, 11.25 per cent family members were having upto primary education and 5.63 per cent family members were illiterate.

In large size group, 46.14 per cent family members were having education upto degree level.

33.79 per cent family members were having secondary education, 15.44 per cent family members were having upto primary education and 4.63 per cent family members were illiterate.

In overall size group, 47.78 per cent family members were having education upto degree level.

34.87 per cent family members were having secondary education, 13.11 per cent family members were having upto primary education and 4.24 per cent family members were illiterate.

4.3 Land use pattern of growers

Table 4.3 revealed that the total land holding in respect of small, medium and large of size group was 3.55 ha, 3.67 ha and 3.81 ha, respectively and at overall level it was 3.68 ha. The net cropping area for small, medium and large size groups was 3.33 ha, 3.41 ha and 3.55 ha respectively.

Table 4.3 Land use pattern of growers

(ha)

Sr. No.	Particulars	Size Groups			
		Small	Medium	Large	Overall
1	Total land holding	3.55 (100)	3.67 (100)	3.81 (100)	3.68 (100)
2	Permanent fallow	0.12 (3.38)	0.15 (4.09)	0.15 (3.94)	0.14 (3.81)
3	Operational holding	3.33 (93.80)	3.41 (92.92)	3.55 (93.18)	3.43 (93.20)
a.	Irrigated	2.68 (75.49)	2.81 (76.56)	2.85 (74.81)	2.78 (75.54)
b.	Unirrigated	0.65 (18.31)	0.60 (16.36)	0.70 (18.37)	0.65 (17.66)
4	Current fallow	0.10 (2.82)	0.11 (2.99)	0.11 (2.88)	0.11 (2.99)
5	Net Cropping Area (NCA)	3.33 (93.81)	3.41 (92.92)	3.55 (93.17)	3.43 (93.21)
6	Gross Cropped Area (GCA)	5.41	5.05	4.45	4.97

(Figures in parentheses are the percentage to the total holding)

At overall level that operational holding was 93.20 per cent of total area. The proportion of permanent follow to the total holding was 3.81 per cent, at overall level.

4.4 Cropping pattern of growers

Cropping pattern refers to proportion of the area under different crops. The Table 4.4 presented the information on area under different crops during the year 2014-15 on the farms of the sample growers.

At the overall level soybean occupied 18.11 per cent of the gross cropped area. Cotton, *kharif* jowar occupied 14.28 and 7.85 per cent area to the gross cropped area, respectively. In *rabi* season at the overall level major crops were wheat, gram and *rabi* jowar which accounted 12.87, 8.25 and 7.85 per cent, respectively.

The total area under sweet orange was 2.77, 7.92, 24.04 and 10.06 per cent on small, medium, large and overall level respectively, to the gross cropped area of the sample growers.

In *kharif* crop cotton occupied 14.78, 15.84 and 11.46 per cent area respectively in small, medium and large size groups.

At the overall level the gross cropped area was 4.97 ha. It was 5.41, 5.05 and 4.45 ha in small, medium and large size groups, respectively. At the overall level cropping intensity was observed as 144.89 per cent.

Table 4.4 Cropping pattern of growers**(ha)**

Sr. No.	Particulars	Size Groups			
		Small	Medium	Large	Overall
1	<i>Kharif Crops</i>				
a.	Cotton	0.80 (14.78)	0.80 (15.84)	0.51 (11.46)	0.71 (14.28)
b.	Soybean	1.12 (20.71)	1.01 (20.00)	0.58 (13.07)	0.90 (18.11)
c.	Pigeon pea	0.35 (6.47)	0.27 (5.35)	0.23 (5.17)	0.28 (5.64)
d.	Green gram	0.48 (8.87)	0.26 (5.15)	0.34 (7.64)	0.36 (7.24)
e.	Kh.jowar	0.35 (6.47)	0.41 (8.12)	0.41 (9.22)	0.39 (7.85)
f.	Black gram	0.16 (2.96)	0.14 (2.77)	0.08 (1.79)	0.13 (2.62)
g.	Sub total	3.26 (60.26)	2.89 (57.23)	2.15 (48.32)	2.77 (55.74)
2	<i>Rabi Crops</i>				
a.	Wheat	1.01 (18.67)	0.66 (13.07)	0.25 (5.61)	0.64 (12.87)
b.	<i>Rabi jowar</i>	0.44 (8.14)	0.46 (9.11)	0.26 (5.84)	0.39 (7.85)
c.	Gram	0.45 (8.32)	0.41 (8.12)	0.37 (8.32)	0.41 (8.25)
	Sub total	1.90 (35.12)	1.53 (30.29)	0.88 (19.78)	1.44 (28.95)
3	Vegetables	0.04 (0.74)	0.18 (3.57)	0.24 (5.39)	0.15 (3.02)
4	Sweet Orange	0.15 (2.77)	0.40 (7.92)	1.07 (24.04)	0.54 (10.86)
5	Other fruit crops	0.06 (1.11)	0.05 (0.99)	0.11 (2.47)	0.071 (1.43)
	Gross Cropped Area (GCA)	5.41 (100)	5.05 (100)	4.45 (100)	4.97 (100)
	Cropping Intensity (%)	162.46	148.09	125.35	144.89

(Figures in parentheses are the percentage to the gross cropped area)

4.5 Farm Assets and Investment of sample growers

Investment is presented in Table 4.5. It can be observed that per farm total value of farm implements and machinery was worked out to ₹ 179027.2, ₹ 247165 and ₹ 309423.7 for small, medium and large size group respectively. At overall level, investment in farm and machinery was worked out to ₹ 264998.4.

In small size group per farm investment on well 22.91 per cent, electric motor 3.26 per cent, drip system 3.19 per cent, spray pump 0.94 per cent, seed drill 1.75 per cent and Bullock cart 6.96 per cent.

In medium size group per farm investment on well 17.43 per cent, electric motor 2.53 per cent, drip system 3.49 per cent, spray pump 0.63 per cent, seed drill 1.48 per cent, bullock cart 4.93 per cent and tractor 16.89 per cent.

In large size group per farm investment of tractor 20.82 per cent, well 15.95 per cent, electric motor 2.13 per cent, spray pump 0.49 per cent, seed drill 1.23 per cent, Bullock cart 3.89 per cent, respectively.

4.6 Livestock position of selected farmers

Table 4.6 revealed that at the overall level, per farm value of bullock pair, cow and buffalo were ₹ 56444.44, ₹ 23344.44 and ₹ 14467.44 which accounted 56.61 per cent, 23.41 per cent and 14.51 per cent, respectively.

In small size group per farm value of bullock pair, cow, buffalo and goat were ₹ 53166.67, ₹ 21266.67, ₹ 14969.00 and ₹ 2500 which accounted 55.80 per cent, 22.32 per cent and 15.71 per cent, and 2.64 per cent of farm value, respectively.

Table 4.5 Farm assets and Investment of growers
(per farm)

Sr. No.	Particulars	Size group			
		Small	Medium	Large	Overall
		Value (₹)	Value (₹)	Value (₹)	Value (₹)
1	Houses	90328.64 (50.45)	108174.40 (43.76)	129370.60 (41.81)	109758.30 (41.42)
2	Cattle sheds	3605.64 (2.02)	3896.46 (1.57)	4108.39 (1.33)	3876.13 (1.46)
3	Wells	41004.69 (22.91)	43079.02 (17.43)	49344.41 (15.95)	44577.04 (16.81)
4	Electric motors	5821.59 (3.26)	6248.86 (2.53)	6573.43 (2.13)	6223.56 (2.35)
5	Pipelines	11408.45 (6.37)	13760.22 (5.57)	17701.05 (5.72)	14365.56 (5.42)
6	Drip /sprinkler systems	5699.53 (3.19)	8637.61 (3.49)	16337.41 (5.27)	10353.47 (3.91)
7	Spray pumps	1688.89 (0.94)	1556 (0.63)	1524.04 (0.49)	1585.37 (0.59)
8	Plough	1786.67 (0.99)	1951.5 (0.79)	2145.72 (0.69)	1971 (0.74)
9	Harrows	1373.73 (0.77)	1488.01 (0.61)	1374.25 (0.44)	1416.81 (0.54)
10	Hoes	713 (0.39)	782.26 (0.32)	694.2857 (0.23)	737.75 (0.28)
11	Seed drill	3126.67 (1.75)	3654.55 (1.48)	3807.234 (1.23)	3575.82 (1.35)
12	Bullock cards	12469.68 (6.96)	12186.06 (4.93)	12042.86 (3.89)	12224.24 (4.62)
13	Tractors and implements	0.00 (0.00)	41750.00 (16.89)	64400 (20.82)	54333.33 (20.51)
	Total	179027.2 (100)	247165 (100)	309423.7 (100)	264998.4 (100)

(Figures in parentheses are the percentage to the total value)

Table 4.6 Livestock position of sample growers
(per farm)

Sr. No.	Particulars	Size group			
		Small	Medium	Large	Overall
		Value (₹)	Value (₹)	Value (₹)	Value (₹)
1	Bullock pair	53166.67 (55.80)	55166.67 (57.74)	61000.00 (56.32)	56444.44 (56.61)
2	Cow	21266.67 (22.32)	23533.33 (24.63)	25233.33 (23.29)	23344.44 (23.41)
3	Cow calf	1566.67 (1.64)	1766.67 (1.85)	566.67 (0.52)	1300.00 (1.30)
4	Buffalo	14969.00 (15.71)	9700.00 (10.15)	18733.33 (17.30)	14467.44 (14.51)
5	Buffalo calf	1533.33 (1.61)	1333.33 (1.40)	1466.67 (1.35)	1444.44 (1.45)
6	Goat / Sheep	2500.00 (2.64)	3733.33 (3.91)	1200.00 (1.11)	2477.78 (2.49)
7	Poultry etc.	270.00 (0.28)	306.67 (0.32)	110.00 (0.11)	228.89 (0.23)
	Total	95272.33 (100)	95540.00 (100)	108310.00 (100)	99707.44 (100)

(Figures in parentheses are the percentage to the total value)

In medium size group per farm value of bullock pair, and cow, were ₹ 55166.67 and ₹ 23533.33, which accounted 57.74 and 24.63 per cent, respectively. In large size group per farm value of bullock pair, and cow, were ₹ 61000.00 and ₹ 25233.33, which accounted 56.32 and 23.29 per cent, respectively.

4.7 Area, production and productivity of sweet orange in Maharashtra.

The year wise data on area, production and productivity of sweet orange in Maharashtra for the last ten year's i.e. from 2003-04 to 2012-13 have been analyzed and annual average are worked out and are shown in Table 4.7.

The area under sweet orange in Maharashtra was 81.40 thousand ha during the year 2003-04 which increased to 99 thousand ha during the year 2012-13. Area under sweet orange might have been increased due to favorable climatic conditions, high yielding variety of sweet orange and high returns realized from it.

The production of sweet orange was 561.66 thousand MT during the year 2003-04 and it has decreased to 399.96 thousand MT.

The productivity of sweet orange was 6.90 MT/ha during the year 2003-04 and it decreased to 4.04 MT/ha during the year 2012-13.

Table 4.7 Area, production and productivity of sweet orange in Maharashtra

Sr. No.	Year	Area ('000'ha)	Per cent change over the year 2003-04	Production ('000'MT)	Per cent change over the year 2003-04	Productivity (MT/ha)
1	2003-04	81.40	100.00	561.66	100.00	6.90
2	2004-05	81.40	0.00	626.78	16.93	7.70
3	2005-06	91.60	12.53	613.72	9.27	6.70
4	2006-07	93.60	14.98	668.28	18.98	7.14
5	2007-08	98.04	20.42	676.48	20.44	6.90
6	2008-09	99.00	21.62	603.90	7.52	6.10
7	2009-10	108.10	32.80	735.08	30.87	6.80
8	2010-11	107.00	31.45	652.70	16.21	6.10
9	2011-12	107.00	31.45	535.00	-4.75	5.00
10	2012-13	99.00	21.62	399.96	-28.79	4.04

Source *www.indiastat.com*

4.8 Growth rates in area, production and productivity of sweet orange in Maharashtra

The annual compound growth rates in area, production and productivity of sweet orange in Maharashtra are estimated and results are shown in Table 4.8.

The annual compound growth rates in area under sweet orange for the overall period of 10 year was estimated to 9.29 per cent which is significant at 5 per cent level. The growth rate of production of sweet orange was -10.79 per cent per annum which is non-significant. The growth rate of productivity of sweet orange for overall period was estimated to -10.69 per cent per annum which negatively significant at 10 per cent level.

In period I, the growth rate of area under sweet orange was estimated to 3.01 per cent which is highly significant at 1 per cent level. The growth rate of production of sweet orange has increased at the rate of 6.96 per cent per annum which is significant at 5 per cent level. The growth rate of productivity of sweet orange was estimated to -1.69 per cent per annum which is non-significant.

In period II, the growth rate of area under sweet orange was estimated to 5.25 per cent which is significant at 5 per cent level. The growth rate of production of sweet orange was -13.76 per cent per annum which is non-significant. The productivity of sweet orange was -18.06 per cent per annum which is non-significant.

Table 4.8 Period Wise Compound growth rates of sweet orange of Maharashtra

Sr. No.	Period	Compound growth rates		
		Area	Production	Productivity
1	I (2003-07)	3.011*** (0.00395)	6.96** (0.125478)	-1.699 ^{NS} (0.125641)
2	II (2007-13)	5.25** (0.007072)	-13.764 ^{NS} (0.023166)	-18.065 ^{NS} (0.01637)
3	Overall Period (2003-13)	9.29** (0.002652)	-10.79 ^{NS} (0.029957)	-10.699* (0.029769)

, *, **** = Significant at 10, 5 and 1 % significance level, respectively

4.9 Area, production and productivity of sweet orange in Jalna district

The year wise data on area production and productivity of sweet orange in Jalna district for the last ten year's i.e. from 2003-04 to 2012-13 have been analyzed and annual average are worked out and are shown in Table 4.9.

The area under sweet orange in Jalna district was 5707 ha during the year 2003-04 and increased to 11600 ha. during the year 2012-13. Area under sweet orange might have been increased due to favorable climatic conditions, high yielding variety of sweet orange and high returns realized from it.

The production of sweet orange was 438.75 hundred MT during the year 2003-04 and it has increased to 1577.60 hundred MT. The production of sweet orange has increased largely due to increase productivity and increase in area under crop.

The productivity of sweet orange was 76.88 qtl/ha during the year 2003-04 and it increased upto 136 qtl/ha during the year 2012-13. The acreage under sweet orange has shown increasing trend and the productivity also seen increased.

4.10 Growth rates in area, production and productivity of sweet orange in Jalna district

The annual compound growth rates in area, production and productivity of sweet orange in Jalna district are estimated and results are shown in Table 4.10.

Table 4.9 Area, production and productivity of sweet orange in Jalna district

Sr. No.	Year	Area ('000'ha)	Per cent change over the year 2003-04	Production ('000'MT)	Per cent change over the year 2003-04	Productivity (q/ha)
1	2003-04	5707	100.00	438.75	100	76.88
2	2004-05	5707	0.00	525.39	19.75	92.06
3	2005-06	6317	10.68	645.91	47.22	102.25
4	2006-07	9264	62.32	1401.92	219.52	151.33
5	2007-08	8805	54.28	1194.22	172.00	135.63
6	2008-09	8805	54.28	805.04	83.48	91.43
7	2009-10	10640	86.44	1276.80	191.00	120.00
8	2010-11	11900	108.52	1190.00	171.23	100.00
9	2011-12	12000	110.27	1080.00	146.15	90.00
10	2012-13	11600	103.26	1577.60	259.56	136.00

Source: Directorate of Economics and Statistics, Govt. of Maharashtra, 2014

The annual compound growth rates in area under sweet orange for the overall period of 10 year was estimated to 9.62 per cent which is highly significant at 1 per cent level. The growth rate of production of sweet orange has decreased during

overall period at the rate of 2.31 per cent per annum which is non-significant. The growth rate of productivity of sweet orange for overall period was estimated to 12.16 per cent per annum which is highly significant at 1 per cent level.

In period I, the growth rate of area under sweet orange was estimated to 14.47 per cent which is significant at 5 per cent level. The growth rate of production of sweet orange has increased at the rate of 17.73 per cent per annum which is significant. The growth rate of productivity of sweet orange was estimated to 34.77 per cent per annum which is significant at 5 per cent level.

In period II, the growth rate of area under sweet orange was estimated to 6.94 per cent which is significant at 10 per cent level. The growth rate of production of sweet orange was 17.73 per cent per annum which is non-significant. The productivity of sweet orange was 12.50 per cent per annum which is non-significant.

Table 4.10 Compound growth rates of sweet orange in Jalna district

Sr. No.	Period	Compound growth rates		
		Area	Production	Productivity
1	I (2003-07)	14.473** (1.24E-06)	17.732** (0.00019)	34.771** (3.42E-05)
2	II (2007-13)	6.947* (9.06E-07)	5.195 ^{NS} (9.65E-05)	12.503 ^{NS} (2.64E-06)
3	Overall Period (2003-2013)	9.629*** (1.73E-06)	2.313 ^{NS} (6.56E-05)	12.165*** (1.59E-06)

*, **, *** = Significant at 10, 5 and 1 % significance level, respectively.

(Figures in the parenthesis are the standard errors of the respective regression coefficient)

4.11 Establishment cost of sweet orange orchard

Sweet orange is a perennial fruit crop which once established, continuous to bear fruits for number of years. Therefore, proper establishment of the sweet orange orchard acts as a base for further prospects of income from the crop. The initial cost of establishing an orchard, forms a major share in the total cost. The growers must have developed high level commercial outlook and must be keen on rational utilization of production resources.

The cost of establishing the sweet orange garden included the initial investment on planting. These costs are added to the operating and maintenance expenses of the orchard until they start bearing. Experience of sweet orange growers in the area under study indicated that the well cared orchards with manuring and fertilizers applications as well as control of pests and diseases in initial stages results in to good vegetative growth and early bearing. Though the yields obtained in first harvest are less than the normal yields, they cannot be neglected, as they are sufficient to offset the major part of establishment cost. It has been observed that the cultivators growing sweet orange in the tract under study were successful in obtaining normal yields from second harvest onwards.

In the present study also the establishment cost of the sweet orange orchard cultivations have been worked out and the details of cost items and cost associated are presented in Table 4.11.

The table showed that the per hectare cost of establishment of sweet orange orchard was worked out to the ₹ 109093.69 at overall level. This cost was total expenditure on sweet orange orchard. The major items of the cost were hired male labour ₹ 26482.67 which accounted 24.28 per cent, followed by the value of manure ₹ 23905.10, irrigation charges ₹ 3675.55, seedlings ₹ 2630.51 and plant protection charges ₹ 1613.39 which accounted 21.91 per cent, 3.37 per cent, 2.41 per cent and 1.48 per cent share in the total cost 'C' respectively. The cost 'A' constituted major proportion to the extend of 79.26 percent in the total cost at the overall level.

The cost 'C' which formed the cost of establishment was highest i.e. ₹ 122986.66 in case of large size group followed by ₹ 108609.83 and ₹ 95684.56 in case of medium and small size groups respectively.

The cost 'A' shared 79.52, 78.94 and 79.33 per cent in the total cost in small, medium and large size groups, respectively. The main item in the establishment cost of sweet orange orchard in small, medium and large group was hired male labor which accounts 24.78, 24.23, and 23.92 per cent respectively.

The cost 'B' shared ₹ 85757.26, ₹ 98871.33 and ₹ 112085.04 which accounted 89.62, 91.03 and 91.14 per cent in small, medium and large size groups, respectively.

Table 4.11 Establishment cost of sweet orange orchard (per ha)

Sr. No.	Items of cost	Size group							
		Small		Medium		Large		Overall	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value
1	Hired human labour								
	a.Male (Man days)	94.83	23707.50 (24.78)	114.4s3	26318.90 (24.23)	119.60	29421.60 (23.92)	109.62	26482.67 (24.28)
	b.Female (Man days)	26.30	4102.80 (4.29)	29.57	4435.50 (4.08)	35.27	4937.80 (4.01)	30.38	4492.03 (4.12)
2	Bullock pair (Pair days)	8.94	5542.80 (5.79)	7.70	4620.00 (4.25)	9.13	5204.10 (4.23)	8.59	5122.30 (4.70)
3	Machine labour (Hrs.)	-	-	1.03	930.00 (0.86)	1.53	1073.33 (0.87)	0.86	667.78 (0.61)
4	Seedling (Nos.)	273.91	3150.00 (3.29)	276.67	2766.67 (2.55)	279.86	2518.75 (2.05)	278.61	2630.51 (2.41)
5	Manure (qtl)	104.25	19285.21 (20.15)	135.83	24449.40 (22.51)	152.90	27980.70 (22.75)	130.99	23905.10 (21.91)
6	Fertilizer(kg)								
	a. Nitrogen	98.13	1373.82 (1.44)	105.20	1420.20 (1.31)	101.77	1221.24 (0.99)	101.70	1338.42 (1.23)
	b. Phosphorus	67.52	1701.50 (1.78)	73.75	1880.63 (1.73)	82.73	2084.80 (1.70)	74.67	1888.98 (1.73)
	c. Potassium	101.09	1769.08 (1.85)	116.12	2090.16 (1.92)	146.22	2558.85 (2.08)	121.14	2139.36 (1.96)
7	Irrigation charges (₹)		3503.33 (3.66)		3720.00 (3.43)		3803.33 (3.09)		3675.55 (3.37)
8	Plant protection charges (₹)		1069.43 (1.12)		1455.67 (1.34)		2315.06 (1.88)		1613.39 (1.48)
	Working Capital		65205.47 (68.15)		74087.12 (68.21)		83119.56 (67.58)		74137.38 (67.96)

Table 4.11 contd.....

Sr. No.	Items of cost	Size group							
		Small		Medium		Large		Overall	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value
9	Ints on working capital @ 6 %		3912.33 (4.09)		4445.23 (4.09)		4987.17 (4.06)		4448.24 (4.08)
10	Depre.on Farm Implements		6641.92 (6.94)		6860.88 (6.32)		9112.90 (7.41)		8494.12 (7.79)
11	Land revenue (₹)		331.73 (0.35)		342.08 (0.31)		347.43 (0.28)		344.50 (0.32)
	Cost 'A'		76091.44 (79.52)		85735.31 (78.94)		97567.06 (79.33)		86464.61 (79.26)
12	Interest on Fixed Capital		9665.82 (10.10)		13136.02 (12.09)		14517.98 (11.80)		13194.73 (12.09)
	Cost ' B '		85757.26 (89.62)		98871.33 (91.03)		112085.04 (91.14)		98904.55 (90.66)
13	Family labour								
	a) Male (Man days)	23.61	5902.50 (6.17)	23.80	5474.00 (5.04)	26.77	6585.42 (5.35)	24.73	5987.31 (5.49)
	b) Female (Man days)	25.80	4024.80 (4.21)	28.43	4264.50 (3.93)	30.83	4316.20 (3.51)	28.35	4201.83 (3.85)
	Cost ' C '		95684.56 (100)		108609.83 (100)		122986.66 (100)		109093.69 (100)

(Figures in parentheses indicate the percentages to the Cost)

4.12 Resource use of sweet orange orchard (Fruiting)

Per hectare inputs used in sweet orange orchards were estimated and presented in Table 4.12.

At the overall level human labour 274.90 man days, bullock power 14.46 pair days and manure 53.77 qtl were used respectively.

**Table 4.12 Resource use of sweet orange orchard (Fruiting).
(per ha)**

Sr. No.	Particulars	Size group			
		Small	Medium	Large	Overall
1	Total Human labour (Man days)	278.69	266.58	277.32	274.90
a.	Male	177.61	173.58	181.03	178.95
b.	Female	101.08	93.00	96.29	95.95
2	Bullock power (Pair days)	12.68	13.00	15.22	14.46
3	Machine power (Hrs.)	-	-	-	-
4	Manures (Qtls.)	51.78	53.83	54.01	53.77
5	Fertilizers (Kgs)				
a.	Nitrogen	308.70	304.42	298.68	300.95
b.	Phosphorous	170.43	169.79	170.07	170.04
c.	Potassium	315.43	318.00	306.06	309.74
6	Irrigation Charges (₹)	4503.28	5934.75	4050.88	4538.78
7	Plant protection charges (₹)	11754.35	13011.67	10310.60	11082.42
8	Yield obtained (Qtls)	148.71	128.69	125.10	128.10

Use of human labour was highest in small size group 278.69 days whereas in medium and large group, it was 266.58 day and 277.32 days, respectively. The fertilizers use was also

high in small size group as compared to medium and large size groups.

Irrigation charges ₹ 5934.75 were high in case of medium size group followed by small ₹ 4503.28 and medium ₹ 4050.88 size groups, respectively. Plant protection charges ₹ 13011.67 was also high in medium size group followed by small ₹ 11754.3 and medium ₹ 10310.60 size groups, respectively. Along with these input bullock power 15.22 pair days, and manures 54.01 qtl were high in large size group.

4.13 Cost of maintenance of sweet orange orchard

Cost of maintenance of sweet orange orchard was estimated by using standard cost concepts and same is presented in Table 4.13 and Fig. 2.

At overall level, the per hectare cost of maintenance of sweet orange worked out to be ₹ 196939.91. The cost 'A' was ₹ 109678.2 contributing 55.69 per cent share in the cost 'C'. In cost 'A', the major item of cost was hired male labour i.e. ₹ 37992.61 contributing 19.29 per cent share in the cost 'C'. The per hectare expenditure on bullock power was worked out to ₹ 8392.81 contributing 4.26 per cent share in the cost 'C'. The expenditure on manure, irrigation charges and plant protection charges were worked out to ₹ 9810.22, ₹ 4538.78 and ₹ 11082.42 which accounted 4.98, 2.30 and 5.63 per cent share, respectively in cost 'C'.

In the cost 'B' the major items of expenditure were the rental value of land and the amortization cost which worked out

to be ₹ 60682.36 and 11232.59 in order to constituting 30.81 and 5.70 per cent share in the total cost 'C', respectively.

For the small size group the per hectare cost of maintenance was ₹ 213956.65. Out of which amount of cost 'A' was ₹ 110361.79 constituting 51.58 per cent in the total cost (i.e. cost 'C'). In the cost 'A' the major item was hired male labour ₹ 38967.39 constituting 6.84 per cent share in the total cost 'C'. The per hectare expenditure on manure was worked out to ₹ 9579.78 which accounted 4.48 per cent share in the total cost 'C'. In case of cost 'B' the major items of expenditures were rental value of land and amortization cost contributing 35.84 and 4.60 per cent share in the total cost 'C', respectively.

Per hectare cost of maintenance for medium size group was ₹ 193793.77. The per hectare cost 'A' incurred in sweet orange production was ₹ 107013.27 which accounted 55.22 per cent share in the total cost 'C'. The major item of cost 'A' was hired human labour (₹ 34749.17) and its share in the cost 'C' was 17.93 per cent. The expenditure on bullock labour constituted 4.02 per cent share in the total cost. The expenditure on manure was ₹ 9690 and its share in the cost 'C' was 5 per cent.

In the cost 'B', the major items of expenditure was rental value of land constituting 31.90 per cent in the cost 'C'. The share of amortization cost was 5.77 per cent in the cost 'C'.

For the large size group the per hectare cost of maintenance was ₹ 195748.04. Out of which amount of cost 'A' was ₹ 110526.28 constituting 56.46 per cent in the total cost (i.e. cost 'C'). In the cost 'A' the major item was hired male labour

(₹ 39005.47) constituting 19.93 per cent share in the total cost 'C'. The per hectare expenditure on manure was worked out to ₹ 9883.83 which accounted 5.05 per cent share in the total cost 'C'. In case of cost 'B' the major items of expenditures were rental value of land and amortization cost contributing 29.69 and 6.47 per cent share in the total cost 'C', respectively.

4.14 Costs, returns, gross income and B:C ratio for sweet orange orchard

At the overall level, the per hectare gross return was found to be ₹ 365150.33. The per hectare gross returns of sweet orange in small, medium and large size group was ₹ 461075.35, ₹ 372010.62 and ₹ 329742.07, respectively as depicted in Table 4.14.

At the overall level, net returns obtained from sweet orange at cost 'C' was ₹ 168206.18 per hectare. It was obtained from sweet orange at cost 'C' was ₹ 247107.92, ₹ 178209.62 and ₹ 154000.61 per hectare from small, medium and large groups, respectively.

The benefit cost ratio indicates the return from each rupee investment in sweet orange cultivation. The result revealed that the B:C ratio is highest in small size group and it was 2.15. Similarly B:C ratio was 1.92 and 1.79 for medium and large size groups, respectively.

Table 4.13 Cost of maintenance of sweet orange orchard

(Per ha)

Sr. No.	Items of cost	Size group							
		Small		Medium		Large		Overall	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value
1	Hired Human labour								
	a. Male (Man days)	155.87	38967.39 (18.21)	151.08	34749.17 (17.93)	158.56	39005.47 (19.93)	156.54	37992.61 (19.29)
	b. Female (Man days)	75.65	11801.74 (5.52)	76.92	11537.50 (5.95)	74.12	10376.47 (5.30)	74.92	10781.38 (5.47)
2	Bullock power (Pair days)	12.68	7861.60 (3.67)	13.00	7800.00 (4.02)	15.22	8673.91 (4.43)	14.46	8392.81 (4.26)
3	Machine power	-	-	-	-	-	-	-	-
4	Manures (Qtls.)	51.78	9579.78 (4.48)	53.83	9690.00 (5.00)	54.01	9883.83 (5.05)	53.77	9810.22 (4.98)
5	Fertilizers (Kg)								
	a. Nitrogen	308.70	4321.80 (2.02)	304.42	2435.33 (1.26)	298.68	3584.16 (1.83)	300.95	3378.77 (1.72)
	b. Phosphorus	170.43	4294.96 (2.01)	169.79	4329.69 (2.23)	170.07	4285.85 (2.19)	170.04	4297.08 (2.18)
	c . Potassium	315.43	5520.11 (2.58)	318.00	5724.00 (2.95)	306.06	5509.06 (2.81)	309.74	5561.04 (2.82)
6	Irrigation Charges (₹)		4503.28 (2.10)		5934.75 (3.06)		4050.88 (2.07)		4538.78 (2.30)
7	Plant protection charges (₹)		11754.35 (5.49)		13011.67 (6.71)		10310.60 (5.27)		11082.42 (5.63)
8	Incidental charges (₹)		873.26 (0.41)		730.33 (0.38)		812.83 (0.42)		797.55 (0.40)
9	Reapirs (₹)		521.00 (0.24)		535.17 (0.28)		530.39 (0.27)		530.73 (0.27)
	Working capital (₹)		99999.27 (46.74)		96477.60 (49.78)		97023.46 (49.57)		97164.53 (49.34)

Table 4.13 contd....

Sr. No.	Items of cost	Size group							
		Small		Medium		Large		Overall	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value
10	Int.on Working Capital		5999.96 (2.80)		5788.66 (2.99)		5821.41 (2.97)		5829.87 (2.96)
11	Depre.on farm implements		4191.47 (1.96)		4573.93 (2.36)		7504.74 (3.83)		6508.48 (3.30)
12	Land revenue and taxes		171.09 (0.08)		173.08 (0.09)		176.68 (0.09)		175.32 (0.09)
	Cost 'A'		110361.79 (51.58)		107013.27 (55.22)		110526.28 (56.46)		109678.20 (55.69)
13	Rental value of land		76673.01 (35.84)		61827.48 (31.90)		58114.76 (29.69)		60682.36 (30.81)
14	Int .on fixed capital @ 10 % (₹)		7667.30 (3.58)		6182.75 (3.19)		5811.48 (2.97)		6068.24 (3.08)
15	Amortization cost (₹)		9851.95 (4.60)		11182.77 (5.77)		12663.05 (6.47)		11232.59 (5.70)
	Cost 'B'		204554.05 (95.61)		186206.27 (96.08)		187115.57 (95.59)		188485.24 (95.71)
16	Family labour								
	a. Male (Man days)	21.74	5434.78 (2.54)	22.50	5175.00 (2.67)	22.47	5527.76 (2.82)	22.41	5435.65 (2.76)
	b. Female (Man days)	25.43	3967.83 (1.85)	16.08	2412.50 (1.24)	22.18	3104.71 (1.59)	21.03	3019.01 (1.53)
	Cost 'C'		213956.65 (100.00)		193793.77 (100.00)		195748.04 (100.00)		196939.91 (100.00)
	Yield (Qtls) and Income (₹)	148.71	461075.35	128.69	372010.62	125.10	349742.07	128.10	365150.33
	Per quintal cost		1438.78		1505.93		1564.70		1539.32

(Figures in parentheses indicate the percentages to the cost)

**Table 4.14 Costs, returns, gross income and B:C ratio for
sweet orange (per ha)**

Sr. No.	Particulars	Size groups				
		Units	Small	Medium	Large	Overall
1	Total cost					
i.	Cost 'A'	₹	110361.79	107013.27	110526.28	109678.20
ii.	Cost 'B'	₹	204554.05	186206.27	187115.57	188485.24
iii.	Cost 'C'	₹	213956.65	193793.77	195748.04	196939.91
2	Profit at (Net returns)	₹				
i.	Cost 'A'	₹	350702.78	264990.12	239222.36	255467.88
ii.	Cost 'B'	₹	256510.52	185797.12	162633.08	176660.84
iii.	Cost 'C'	₹	247107.92	178209.62	154000.61	168206.18
3	Production	qtl	148.71	128.69	125.10	128.10
4	Average rate obtained	₹/qtl	3100.5	2890.75	2795.7	2850.51
5	Gross Income	₹	461075.35	372010.62	349742.07	365150.33
6	B:C ratios					
i.	Cost 'A'		4.18	3.48	3.16	3.33
ii.	Cost 'B'		2.25	2.00	1.87	1.94
iii.	Cost 'C'		2.15	1.92	1.79	1.85

At overall level B:C ratio at cost 'C' was 1.85. It clearly indicates that, the sweet orange cultivation is a profitable fruit crop.

4.15 Functional analysis

Production of sweet orange involved relationship between inputs and their outputs. It provides a tool by mean of which the problems of production can be analyzed.

The empirical evidences from previous studies suggest that amongst the many mathematical functions, Cob-Douglas type of production function is the appropriate one for the study of resource productivity, because it specifies diminishing

productivity and diminishing marginal rate of substitution among the factor and gives specific diminishing, increasing or constant returns. The data were therefore, subjected to functional analysis by using the following type of Cobb-Douglas production function

$$Y = a X_1^{b_1} X_2^{b_2} \dots X_n + e^u.$$

In this functional formula 'Y' is dependent variable, X_i 's are independent resource variables, 'a' is constant representing intercept of the production function and b_i 's are the regression coefficients. In logarithmic terms, this function transforms into a linear form of the following type.

$$\log Y = \log a + b_1 \log X_1 + b_2 \log X_2 + \dots + b_n \log X_n + u \log e.$$

For fitting the production function, eight inputs *viz.*, human labour, bullock labour, manure, nitrogen, phosphorus, potassium, irrigation and plant protection have been considered as important factors in the production of crop.

The output of the crop has been used as dependant variable. The equation fitted was at the following from

$$Y = aX_1^{b_1}X_2^{b_2}X_3^{b_3}X_4^{b_4}X_5^{b_5}X_6^{b_6}X_7^{b_7}X_8^{b_8} + e^u$$

Where,

Y = Output of main produce (qtl/ha)

X_1 = Human labour (man days/ha)

X_2 = Bullock (pair days/ha)

X_3 = Manures (qtl/ha)

X_4 = Nitrogen (kg/ha)

X_5 = Phosphorus (kg/ha)

X_6 = Potassium (kg/ha)

- X_7 = Irrigation (₹/ha)
 X_8 = Plant protection (₹/ha)
 u = Error term
 a = Intercept
 b_i 's = Regression coefficient

1. Small farmers groups

The value of coefficient of multiple determination (R^2) was found to be 0.94 per cent that means 94 per cent variation in output was jointly explained by the eight independent resource variables under consideration (Table 4.15). The regression coefficient of variable, human labour (X_1), bullock labour (X_2), manure (X_3) and nitrogen (X_4) were positive and significant. Whereas potassium (X_6) was negatively significant. Human labour was highly significant at 1 per cent level. It indicated that if we increase the human labour by 1 unit the output will increase by 0.49 per cent.

2. Medium farmers group

The estimated parameters of human labour (X_1), manure (X_3) and potassium (X_6) were significant indicating there by that for every one unit increase in the expenditure on these resources would results in increased gross return by 1.0 per cent, 0.31 per cent, and 0.24 per cent respectively. The value of coefficient of multiple determinations (R^2) was found to be 0.92 per cent that means 92 per cent variation in output was jointly explained by the eight independent resource variables under consideration.

3. Large farmers group

In case of large size group of holding, the value of coefficient of multiple determination R^2 was found to be 0.79 per

cent that means 79 per cent variation in output was jointly explained by the eight independent variables under consideration. Bullock labour (X_2) and irrigation charges were positive and significant at 1 and 10 per cent level, respectively.

4. Overall level

At the overall level, coefficient of multiple determinations (R^2) was found to be 0.65 indicating that 65 per cent variation in output is jointly explained by the above considered independent variables. The regression coefficients of bullock labour (X_2), and nitrogen (X_4) were turned out statistically significant. For bullock labour it was significant at 1 per cent level, and for nitrogen it was significance at 5 per cent level.

Table 4.15. Results of estimated Cobb-Douglas production function for different size groups of Sweet Orange growers

Sr. No.	Particulars	Units	Size groups			
			Small	Medium	Large	Overall
1	Intercept		0.513	1.148	1.161	1.329
2	Human Labour (X_1)	Days	0.498*** (0.0690)	1.005*** (0.2105)	-0.128** (0.0513)	-0.020 (0.0551)
3	Bullock Labour (X_2)	Days	0.185** (0.0804)	0.033 (0.0556)	0.389** (0.1488)	0.191*** (0.0656)
4	Manure (X_3)	Qtl	0.152* (0.0865)	0.319*** (0.1146)	-0.094 (0.2122)	0.057 (0.1189)
5	Nitrogen (X_4)	Kg	0.291*** (0.0705)	-0.027 (0.0476)	-0.034 (0.2499)	0.171** (0.0799)
6	Phosphorus (X_5)	Kg	-0.009 (0.0232)	-0.014 (0.0266)	-0.036 (0.1262)	-0.012 (0.0371)
7	Potassium (X_6)	Kg	-0.161*** (0.0409)	0.245** (0.1046)	-0.022 (0.2271)	-0.003 (0.0744)
8	Irrigation charges (X_7)	₹	-0.152 (0.1168)	-0.051 (0.0784)	0.522* (0.2857)	-0.063 (0.1086)
9	Plant protection charges (X_8)	₹	0.059 (0.0493)	-0.035 (0.0805)	0.041 (0.0951)	0.093 (0.0666)
10	R^2		0.94	0.92	0.79	0.65

***, **, * Indicate significant at 1, 5 and 10 per cent level respectively.

(Figures in the parenthesis are the standard errors of the respective regression coefficient)

This indicated that one unit increased in the bullock labour (X_2) and nitrogen (X_4) would result into 0.19 per cent and 0.17 per cent, increase in the output, respectively, other resources like human labour (X_1), manure (X_3), phosphorus (X_5), potash (X_6) and irrigation (X_7) were found non-significant.

4.16 Resources use efficiency

An efficiency of resources used in sweet orange production on the sample farms was judged with the help of MVP/MC ratio and the results of resource use efficiency are presented in Table 4.16.

It is observed that from the table 4.16 that the marginal value of product to factor cost ratio (MVP/MC) was greater than unity except, phosphorus (X_5), potassium (X_6) and irrigation charges (X_7) in small size group. In medium size group it was greater than unity except Nitrogen (X_4), phosphorous (X_5), irrigation charge (X_7) and plant protection charges (X_8). In case of large group human labour (X_1), manure (X_3), Nitrogen (X_4), phosphorus (X_5) and potassium (X_6) was less than unity. At overall level MVP/MC ratio was greater than unity in case of resource use efficiency like Bullock labour (X_2), manures (X_3), nitrogen (X_4), and plant protection charges (X_8). Whereas the MVP/MC ratio of human labour (X_1), phosphorous (X_5), potassium (X_6) and irrigation charges (X_7) were found to be less than unity depicting the inefficient use of these resources.

Table 4.16 Resource use efficiency in sweet orange production

Sr. No	Particulars	Units	GM	GM Of Y	Unit price output	bi Value	MP	MVP	MC	MVP/ MC
	Small									
1	Human labour (X ₁)	Days	264.68	148.69	3100.50	0.50	0.28	867.60	203.00	4.27
2	Bullock labour (X ₂)	Days	15.82	148.69	3100.50	0.19	1.74	5397.97	619.89	8.71
3	Manures (X ₃)	Qtls.	52.36	148.69	3100.50	0.15	0.43	1340.01	185.00	7.24
4	N (X ₄)	Kg.	274.37	148.69	3100.50	0.29	0.16	488.34	14.00	34.88
5	P (X ₅)	Kg.	144.07	148.69	3100.50	-0.01	-0.01	-27.42	25.20	-1.09
6	K (X ₆)	Kg.	309.58	148.69	3100.50	-0.16	-0.08	-240.39	17.50	-13.74
7	Irri. Charges (X ₇)	₹	4687.39	148.69	3100.50	-0.15	0.00	-14.99	1.00	-14.99
8	Plant protection Charges (X ₈)	₹	11811.27	148.69	3100.50	0.06	0.00	2.30	1.00	2.30
	Medium									
1	Human labour (X ₁)	Days	289.14	127.27	2890.75	1.00	0.44	1278.36	190.00	6.73
2	Bullock labour (X ₂)	Days	12.13	127.27	2890.75	0.03	0.34	992.38	600.00	1.65
3	Manures (X ₃)	Qtls.	59.63	127.27	2890.75	0.32	0.68	1965.97	180.00	10.92
4	N (X ₄)	Kg.	293.45	127.27	2890.75	-0.03	-0.01	-33.84	13.50	-2.51
5	P (X ₅)	Kg.	145.26	127.27	2890.75	-0.01	-0.01	-35.26	25.50	-1.38
6	K (X ₆)	Kg.	314.57	127.27	2890.75	0.24	0.10	286.41	18.00	15.91
7	Irri. Charges (X ₇)	₹	5841.82	127.27	2890.75	-0.05	0.00	-3.19	1.00	-3.19
8	Plant protection Charges (X ₈)	₹	12774.02	127.27	2890.75	-0.04	0.00	-1.02	1.00	-1.02

Table 4.16 contd....

Sr. No	Particulars	Units	GM	GM Of Y	Unit price output	bi Value	MP	MVP	MC	MVP/ MC
	Large									
1	Human labour (X ₁)	Days	250.01	124.33	2795.70	-0.13	-0.06	-177.52	193.00	-0.92
2	Bullock labour (X ₂)	Days	12.45	124.33	2795.70	0.39	3.88	10857.97	570.00	19.05
3	Manures (X ₃)	Qtls.	54.68	124.33	2795.70	-0.09	-0.21	-595.42	183.00	-3.25
4	N (X ₄)	Kg.	304.75	124.33	2795.70	-0.03	-0.01	-38.98	12.00	-3.25
5	P (X ₅)	Kg.	168.91	124.33	2795.70	-0.04	-0.03	-74.62	25.20	-2.96
6	K (X ₆)	Kg.	311.53	124.33	2795.70	-0.02	-0.01	-24.71	18.00	-1.37
7	Irri. Charges (X ₇)	₹	4150.28	124.33	2795.70	0.52	0.02	43.73	1.00	43.73
8	Plant protection Charges (X ₈)	₹	7554.03	124.33	2795.70	0.04	0.00	1.90	1.00	1.90
	Overall									
1	Human labour (X ₁)	Days	267.46	133.00	2850.51	-0.02	-0.01	-27.70	193.29	-0.14
2	Bullock labour (X ₂)	Days	13.37	133.00	2850.51	0.19	1.90	5403.50	582.63	9.27
3	Manures (X ₃)	Qtls.	55.48	133.00	2850.51	0.06	0.14	389.17	182.46	2.13
4	N (X ₄)	Kg.	290.59	133.00	2850.51	0.17	0.08	223.73	12.55	17.83
5	P (X ₅)	Kg.	152.33	133.00	2850.51	-0.01	-0.01	-30.48	25.20	-1.21
6	K (X ₆)	Kg.	311.89	133.00	2850.51	0.00	0.00	-3.29	17.95	-0.18
7	Irri. Charges (X ₇)	₹	4843.79	133.00	2850.51	-0.06	0.00	-4.94	1.00	-4.94
8	Plant protection Charges (X ₈)	₹	10445.62	133.00	2850.51	0.09	0.00	3.36	1.00	3.36

4.17 Marketing of sweet orange

In marketing, the agricultural produce has to undergo a series of operations before it finally reaches to the consumers. The returns depend largely on the way in which these operations are performed. It is strongly applicable to the agricultural produce like fruits and vegetables. And if the fruit is of sweet orange type, a perishable one, at most care is required to be taken while making it ready for marketing.

In the present study, following operations were studied those were performed by the sample sweet orange growers.

4.17.1 Harvesting

Sweet orange generally, improve in taste and in colour after they get harvested. It was observed that sweet orange growers started harvesting of their gardens when fruits matured depending upon the bahar. Sweet orange picking was done by labour by putting fruits in gunny bags kept on the shoulder or in the plastic crates. These fruits were taken in shade. The mrug bahar fruits were harvested during the months of December and February and Ambia bahar fruits were harvested during the months of August to September.

4.17.2 Grading

This function determines the quality of fruits. The grading was generally carried out on the basis of size, shape, colour and weight of the fruits. Several studies conducted in the past have revealed that grading at producer level has significant

effect on realizing better remunerative prices for their produce in the market.

Sweet orange were graded under

Grade I- Superior quality, attractive, large sized (Approx. wt. more than 125 gm).

Grade II- Good quality, attractive, medium sized (Approx. wt. 100 to 125 gm).

Grade III- Less attractive, small sized, with one or two defects/patches. (Approx wt. less than 100 gm).

4.17.3 Production and disposal pattern of sweet orange

The total produce of sweet orange was disposed off as home consumption, gratis, losses due to pests and diseases and the rest was marketed. The information regarding the disposal pattern of sweet orange is given in Table 4.17.

It is revealed that, total quantity of sweet orange produced were 684.05 quintals, 1544.25 quintals and 4253.48 quintals in small, medium and large size groups, respectively.

Table 4.17 Production and disposal pattern of sweet orange

Sr. No.	Particulars	Size groups			
		Small	Medium	Large	Total
1	Total Production	684.05 (100)	1544.25 (100)	4253.48 (100)	6481.78 (100)
2	Home consumption	7.35 (1.07)	8.95 (0.58)	9.75 (0.23)	26.05 (0.40)
3	Gratis	8.90 (1.30)	11.00 (0.71)	14.64 (0.34)	34.54 (0.54)
4	Losses due to pest and diseases	13.76 (2.01)	15.48 (1.00)	31.65 (0.75)	60.79 (0.94)
5	Marketable quantity	654.04 (95.62)	1508.82 (97.71)	4197.44 (98.68)	6360.30 (98.12)

(Figures in parentheses are the percentage to the quantity produced)

Out of this total production, 1.07 per cent was used for home consumption by small groups, whereas 0.58 per cent and 0.23 per cent were used for home consumption for medium and large size groups, respectively. The quantity lost due to pests and diseases were 2.01 per cent, 1.00 per cent and 0.75 per cent of total produce for small, medium and large groups respectively. At total level quantity used for gratis, quantity lost due to pests and diseases were worked out to 0.54 per cent and 0.94 per cent, respectively.

4.17.4 Grade wise quantity of sweet orange produced

Table 4.18 and Fig. 3 reveals that, at overall level, per farm quantity of sweet orange produced by sample farmers was 6360.30 quintals. Out of this total quantity produced, maximum quantity 41.88 per cent was of grade-I which was followed by Grade-II (41.15 per cent) and grade-III (16.96 per cent).

Table 4.18 Grade wise quantity of sweet orange produced

Grade	Size group			Total
	Small	Medium	Large	
I	369.49 (56.49)	648.50 (42.98)	1646.00 (39.21)	2663.99 (41.88)
II	274.45 (41.96)	556.00 (36.85)	1787.00 (42.57)	2617.45 (41.15)
III	10.10 (1.54)	304.32 (20.17)	764.44 (18.21)	1078.86 (16.96)
Total	654.04 (100)	1508.82 (100)	4197.44 (100)	6360.30 (100)

(Figures in parentheses are the percentage to the total)

4.17.5 Packing

Packing of fruits is one of the most important steps in the long and complicated journey from grower to consumer. Packaging protects the produce from mechanical damage and poor environmental conditions during handling and distribution. Packaging materials like wooden boxes, karandi and gunny bags are used for packaging of sweet orange fruits.

4.17.6 Transportation

Quick and efficient transportation of farm produce to the desired place has direct bearing on the operational efficiency in the marketing. Transportation is essential for creation of place utility which helps in timely supply of a particular commodity to both nearby and distant markets. Transport means like minitruck, tempos, minidore and tractor trolley were used for transportation of produce by farmers.

4.17.7 Marketing channels of sweet orange

The consumer always prefer fresh sweet orange. To meet this and to fetch good prices, it becomes necessary to reach the sweet orange quickly as possible to the consuming centres. It mostly depends on the type of marketing channel indicates how the produce passes through different agencies from produce till it reaches to the final consumer. Following different marketing channels were observed.

- I. Producer - Retailer (Local) - Consumer
- II. Producer - Pre-harvest contractor - Wholesaler - Retailer -
Consumer
- III. Producer - Wholesaler - Retailer - Consumer

The detailed information on the quantity of produce sold through different channels by the sweet orange growers in different markets is presented in Table 4.19 and Fig. 4.

It can be seen that there are three different marketing channels in sweet orange marketing. It was observed that at the overall level, marketing channel-III (Producer - Wholesaler - Retailer - Consumer) was the most preferred channel through which 52.05 per cent of the total produce was marketed followed by channel-I (Producer - Retailer (Local) - Consumer) through which 30.26 per cent of the total produce was marketed.

Quantity marketed through channel-II (Producer - Pre harvest contractor - Wholesaler - Retailer - Consumer) is constituting 17.69 per cent of the total produce.

In case of small size group, the maximum quantity (57.35 per cent) of total produce was marketed through channel-III (Producer - Wholesaler - Retailer - Consumer) followed by channel-I (Producer - Retailer (Local) - Consumer) 30.72 per cent. Remaining 11.52 per cent of total produce was marketed through channel-II.

The sweet orange growers from medium size group sold the highest quantity of produce (52.06 per cent) through marketing channel-III (Producer - Wholesaler - Retailer - Consumer), followed by marketing channel-II (31.67 per cent) and Channel-I (16.28 per cent).

In the large size group, highest quantity of produce was marketed through channel-III (Producer - Wholesaler - Retailer - Consumer) followed by Channel-I and Channel-II,

Table 4.19 Channel wise quantity of sweet orange sold

Size group	Channels used	Total quantity marketed (Qtls)	Quantity marketed (qtl)	
			Jalna	Aurangabad
Small	I	200.94 (30.72)	159.82 (35.92)	41.12 (19.66)
	II	77.99 (11.92)	--	77.99 (37.29)
	III	375.11 (57.35)	285.06 (64.08)	90.05 (43.05)
	Sub total	654.04 (100)	444.88 (100)	209.16 (100)
Medium	I	477.80 (31.67)	290.42 (27.65)	187.38 (40.86)
	II	245.60 (16.28)	195.30 (18.60)	50.30 (10.97)
	III	785.42 (52.06)	564.56 (53.75)	220.86 (48.17)
	Sub total	1508.82 (100)	1050.28 (100)	458.54 (100)
Large	I	1245.72 (29.68)	950.21 (35.03)	295.51 (19.90)
	II	801.62 (19.10)	--	801.62 (53.99)
	III	2150.10 (51.22)	1762.50 (64.97)	387.60 (26.11)
	Sub total	4197.44 (100)	2712.71 (100)	1484.73 (100)
Overall	I	1924.46 (30.26)	1400.45 (33.28)	524.01 (24.35)
	II	1125.21 (17.69)	195.30 (4.64)	929.91 (43.20)
	III	3310.63 (52.05)	2612.12 (62.08)	698.51 (32.45)
	Total	6360.30 (100)	4207.87 (100)	2152.43 (100)

(Figures in parentheses are the percentage to the total)

respectively. From the above discussion it is clear that, marketing channel-III (producer - wholesaler - retailer - consumer) was the main channel.

4.18 Cost of marketing

The different marketing functions *viz.*, grading, packing, transportation and handling of produce, etc., are required to be performed in the marketing of sweet orange. The cost incurred for performing these operations is very important in sweet orange marketing because, it reflects on the consumers price and the returns to the producer.

The cost incurred on performing the operations such as grading, packing, transportation and commission charges are worked out and presented in Table 4.20 and Fig. 5.

The per quintal cost of grading was less as compared to per quintal cost of packing material and transportation. The per quintal cost of grading ranged from ₹ 24.25 to 30.13. The cost of packing material was high in comparison with grading cost hamali and weighing charges. The per quintal packing cost was ₹ 37.06. The per quintal transportation charge was ₹ 64.55. The per quintal commission of intermediaries ranged from ₹ 123.55 to ₹ 142.91.

Table 4.20 Item wise per quintal marketing cost of sweet orange
(₹/q.)

Sr. No.	Particulars	Size group			
		Small	Medium	Large	Overall
1	Grading charge	27.49 (10.00)	30.13 (11.19)	24.25 (10.77)	26.25 (10.83)
2	Packing material charges	37.06 (13.49)	36.52 (13.56)	30.82 (13.68)	33.03 (13.62)
3	Transport charges	64.51 (23.47)	50.68 (18.82)	38.00 (16.87)	44.06 (18.17)
4	Hamali	3.70 (1.35)	3.54 (1.31)	3.58 (1.59)	3.58 (1.48)
5	Weighing charges	3.68 (1.34)	2.50 (0.93)	3.18 (1.42)	3.03 (1.25)
6	Commission charges	128.69 (46.82)	142.91 (53.06)	123.55 (54.86)	129.64 (53.46)
7	Other (Breakfast, meal, etc.)	9.70 (3.53)	3.04 (1.13)	1.81 (0.81)	2.88 (1.19)
	Total marketing cost	274.83 (100)	269.31 (100)	225.20 (100)	242.48 (100)
	Average price received	3100.5	2890.75	2795.7	2850.51
	Net Price realized	2825.67	2621.44	2570.50	2608.03

(Figures in parentheses are the percentage to the total marketing cost)

4.19 Problems faced by sweet orange growers in production

To know the problems faced by the growers in production of sweet orange, the growers were interviewed and the results are depicted in Table 4.21.

It was seen that about 90.00 per cent growers from large groups has facing the problems of unavailability of labours on, followed by 66.67 per cent from medium group and 53.33 per cent from small group. At overall group it was about 70.00 per cent.

Availability of quality seedling is also important. At overall level 62.22 per cent growers were not got quality seedlings. Large size groups faced the more problem in getting the quality seedling i.e. 80.00 per cent.

Horticultural crops requires more investment during establishment. At overall level 24.44 per cent growers faced the problem of financial support.

About 63.33 per cent of large size groups facing the problem of high cost of fertilizers, followed by 40.00 per cent medium groups and 30 per cent of small farmers.

At overall the 80.00 per cent farmers were facing the problem of pest and disease. Mostly the large size group farmers (86.67 per cent) were facing the problem of pest and disease followed by medium size (80.00 per cent) and small size groups (73.33 per cent).

For growing any crop technical knowledge is very important. At overall level 70.00 per cent growers were facing the

problem of technical knowledge. Mostly medium size groups were facing the problem of technical knowledge (80.00 per cent), followed by small size (73.33 per cent) and large size groups (56.67 per cent).

Table 4.21 Problems faced by sweet orange growers in production

Sr. No.	Problems	Size group			
		Small	Medium	Large	Total
		N=30	N=30	N=30	N=90
1	Unavailability of quality seedlings	13 (43.33)	19 (63.33)	24 (80.00)	56 (62.22)
2	Unavailability of financial support	7 (23.33)	6 (20.00)	9 (30.00)	22 (24.44)
3	Problems of pests and diseases	22 (73.33)	24 (80.00)	26 (86.67)	72 (80.00)
4	Unavailability of labours on time and high wage rates	16 (53.33)	20 (66.67)	27 (90.00)	63 (70.00)
5	High cost of fertilizers	9 (30.00)	12 (40.00)	19 (63.33)	40 (44.44)
6	Lack of technical knowledge	22 (73.33)	24 (80.00)	17 (56.67)	63 (70.00)
	Total	30 (100)	30 (100)	30 (100)	90 (100)

(Figures in parentheses are the percentage to the total)

4.20 Problems faced by sweet orange growers in marketing

The efficient marketing system not only helps in giving good returns to producer but also satisfied the consumer with minimum price for better quality. The proper marketing practices fetches the good prices to sweet orange. Here, an attempt has been made to highlight the problems in marketing of sweet orange.

The information regarding problems faced by the sweet orange growers in marketing is given in table 4.22.

Grading is important in marketing to get proper prices. At overall level, about 48.89 per cent growers were facing the problems of high cost of grading.

Table 4.22 Problems faced by sweet orange growers in marketing

Sr. No.	Problems	Size groups			
		Small	Medium	Large	Total
		N=30	N=30	N=30	N=90
1	High cost of grading	11 (36.67)	17 (56.67)	16 (53.33)	44 (48.89)
2	Higher rates of packing material	10 (33.33)	20 (66.67)	12 (40.00)	42 (46.67)
3	High transport charges	18 (60.00)	15 (50.00)	22 (73.33)	55 (61.11)
4	High commission charges	21 (70.00)	26 (86.67)	28 (93.33)	75 (83.33)
5	Problems of Price variation in the market	12 (40.00)	19 (63.33)	26 (86.67)	57 (63.33)
6	Lack of pre information network about prices	7 (23.33)	15 (50.00)	19 (63.33)	41 (45.56)
	Total	30 (100)	30 (100)	30 (100)	90 (100)

(Figures in parentheses are the percentage to the total)

Packing is an important aspect in marketing of sweet orange. About 46.67 per cent growers at overall level have pointed out that cost of packing material used for sweet orange marketing is costly.

At overall higher transportation charges and high commission charges were reported by 61.11 and 83.33 per cent, respectively. The price variation also emerge as important problem, about 63.33 per cent of the farmers expressed their concern over this.

5. SUMMARY AND CONCLUSIONS

5.1 Summary

The cultivation of fruit crops plays an important role in the prosperity of a nation and fruit production adds to the health and happiness of the people because of nutritive values. It also helps for the development of several industries like preservation, dehydration, packing, transport and refrigeration ect. and maintains the ecological balance. As it is well known, that India is blessed with varying agro-climatic conditions and has abundant labour force, produces practically all varieties of tropical and sub-tropical fruits.

The present investigation entitled, “Economics of Production and Marketing of Sweet orange in Jalna district of Maharashtra,” was undertaken with the following specific objectives.

1. To estimate the growth rates in area, production and productivity,
2. To study resource use structure, costs and returns,
3. To estimate resource use productivity and resource use efficiency,
4. To study the marketing cost and
5. To identify the problems in production and marketing of sweet orange.

Data for the present study were collected from two tahsils of Jalna district *viz.*, Ambad and Badnapur. These tahsils were selected purposively according to area under sweet orange.

In all six villages, three villages from each tahsil were selected randomly and from six villages 90 sweet orange farmers were selected on the basis of actual area under sweet orange orchard.

All the relevant data required for study purpose were collected by survey method with the help of schedules specially designed for the purpose. Collection of data were done by personal interview with the sample growers.

Information pertaining to input utilization, marketing and constraints was collected for the year 2014-15. The per hectare cost of establishment, cost of maintenance, marketing cost, marketing channel were worked out. All the 90 sweet orange farmers were categorized into three different groups, i.e. small (0.01 to 0.20 ha), medium (0.21 to 0.40 ha) and large (0.41 ha and above). For the analysis of data standard cost concepts were used. The summarized findings of this study are as follows.

The average size of family was ranged from 4.40 in small group, 5.33 in medium group and in large group it was 5.83. At overall level, average family size was 5.19.

Land use pattern of selected farmers showed that at the overall level, total land was worked out to 3.68 ha. Out of this land, about 93.2 per cent area was operational holding, 3.81 per cent was permanent fallow while 75.54 per cent area under irrigation and remaining 17.66 per cent was unirrigated, at overall level. Operational holding of small, medium and large groups were 3.33, 3.41, and 3.55 ha, respectively, which accounted 93.80, 92.92 and 93.18 per cent, respectively.

The selected farmers adopted diversified cropping pattern. In *kharif* season, they were cultivating crops like cotton, soybean, *kharif* jowar, pigeon pea, etc. Among *kharif* crops, cotton and soybean were major crops which combined accounted 32.39 per cent of total gross cropped area. Among *rabi* crops wheat and gram accounted to 12.87 and 8.25 per cent, respectively. Under the plantation crops, farmers were having sweet orange, at overall level which accounted to 10.86 per cent of gross cropped area.

In case of livestock position of selected farmers at overall level, the investment on bullocks was ₹ 56444.44, cows ₹ 23344.44 and buffaloes was ₹ 14467.44 which accounted to 56.61, 23.41 and 14.51 per cent of total investment, respectively. At overall level, the total investment was ₹ 99707.44.

The total investment, on farm implements and machinery in three size groups worked out to ₹ 179027.2, ₹ 247165 and ₹ 309423.7, respectively. At overall level, it worked out to ₹ 264998.4.

It is seen that at the overall level, the per hectare cost of establishment of sweet orange orchard was worked out to ₹ 109093.69. Major items of the total establishment cost were manure, fertilizers, cost of seedlings and human labours etc.

Per hectare cost of maintenance of sweet orange at overall level was worked out to ₹ 196939.91 while per hectare yield was 128.10 quintals indicating thereby per quintal cost of maintenance as ₹ 1539.32. The major items of the cost were hired human labour, plant protection charges, manures and

fertilizers. The share of hired human labour at overall level, was 19.29 per cent of cost 'C'.

It was found that at the overall level, the per hectare yield and gross return obtained were 128.10 quintals and ₹ 365150.33, respectively. B:C ratio, in small, medium and large size groups were worked out to 2.15, 1.92 and 1.79, at cost 'C' respectively. B:C ratio at overall level, at cost 'C' was worked out to 1.85.

In case of the resource use productivities in sweet orange cultivation for different size group of farms, it was observed that all eight variables *viz.*, human labour (X_1), bullock labour (X_2), manures (X_3), nitrogen (X_4), phosphorus (X_5), irrigation (X_7) plant protection (X_8), included in the production function analysis have jointly explained 65 per cent of the total variation in the output of sweet orange.

At overall level 98.12 per cent of total produce was marketed. The remaining produce was used for home consumption, gratis and losses due to pests and diseases. The criteria adopted for grading of sweet orange was size of fruits. The sweet orange growers adopted three grades for grading and sale of fruits.

As regards to quantity sold in different markets at overall level, the largest portion of the total quantity of sweet orange was sold in Jalna market. The average per quintal cost of marketing at overall level, worked out to be Rs 242.48. The major items of the cost of marketing were the commission charges, cost of packing material, cost of transportation etc.

In maintenance of sweet orange orchards there occurred several problems such as high cost of inputs, unavailability of labour on time, problems of pests and diseases etc. In case of marketing, majority of sweet orange growers reported the following problems viz., high cost of grading, higher rates of packing material, high commission charges, problems of price variation.

5.2 Conclusions

From present study, following conclusions are drawn.

- i. The average size of holding was 3.68 ha of which 93.20 per cent land under cultivation. The total investment in livestock and farm implement and machinery was ₹ 99707.44 and ₹ 264998.4, respectively. The production of sweet orange has increased largely due to increase in area under the crop.
- ii. Per hectare establishment cost of sweet orange worked out to ₹ 109093.69.
- iii. Per hectare labour requirement for maintenance of sweet orange orchard was 178.95 and 95.95 days of male and female, respectively.
- iv. Per hectare average yield of sweet orange was 128.10 quintals. The yield increased with age of orchard up to 15 years.
- v. At overall level, per hectare cost of maintenance of sweet orange orchard was worked out to ₹ 213956.65 while, benefit – cost ratio was worked out to 2.15.

- vi. In sweet orange marketing, following three marketing channels were observed in study area.
 - 1. Producer – Retailer – Consumer,
 - 2. Producer – Pre harvest contractor - Wholesaler – Retailer – Consumer,
 - 3. Producer - Wholesaler - Retailer- Consumer.
- vii. High cost of input and high labour cost were the major constraints in production of sweet orange whereas, high rate of commission was the major constraints in marketing of sweet orange.

5.3 Suggestions

With the results obtained from the research study following few suggestions can be made.

- 1. The sweet orange growers should increase the use of male and bullock labours, nitrogenous and potassium fertilizers for increasing the yield of sweet orange.
- 2. For having the maximum quantity of grade-I produce, the sweet orange growers have to follow the package of practices and recommended doses of all inputs and
- 3. The sweet orange growers seek the technical knowledge from the State Agriculture Universities (SAUs) and other extension agencies for solving the problem in the production and marketing of sweet orange to have maximum income and profit.

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7. APPENDICES

Part-I

Questionnaire

**"Economics of production and marketing of sweet orange in
Jalna district of Maharashtra"**

1. Name of sweet orange grower :

Age : Education: Occupation :

Village : Tal : District :

Phone No :

2. Family information

Sr. No.	Name	Relationship with head of family	Age (years)	Education	Occupation	Income (₹)

3. Land use Pattern

Sr. No.	Soil type	Total holding	Permanent Fallow	Operational holding		Current fellow	Land revenue	Present value
				Irrigated	Rainfed			

4. Cropping pattern (2014-15)

Sr. No.	Season	Crop	Area (ha)		Production (qtls/tones)		Income (₹)
			Irrigated	Rainfed	Main	By	
1.	<i>Kharif</i>	1					
		2					
		3					
		4					
		5					
		6					
2.	<i>Rabi</i>	1					
		2					
		3					
		4					
		5					
		6					
3.	Summer	1					
		2					
		3					
		4					
		5					
		6					
4.	Annual	1					
		2					
		3					
		4					
5.	Fruit crops	1					
		2					
		3					
6.	Vegetables	1					
		2					
		3					
		4					
		5					

5. Buildings

Sr. No.	Building type	Size	Building year	Present value (₹)	Repairing charges (₹)	Remaining life (years)
1	House					
2	Farm house					
3	Cattle shed					
4	Store house					
5	Shop					
6	Other					

6. Irrigation Structure

Sr. No	Type	Digging/ Purchasing Year	Present value (₹)	Irrigation capacity (ha)	Remaining life (years)	Repairing Charges (₹)
1	Well					
2	Bore-well					
3	Pipe line(m/f)					
4	Electric motor (hp)					
5	Diesel engine					
6	Drip/sprinkler system					
7	Other					

7. Farm Implements and Machineries

Sr. No	Particulars	Number	Purchase year	Purchase Cost (₹)	Repairing charges (₹)	Remaining life
A	Implements					
1	Wooden plough					
2	Iron plough					
3	Bullock card					
4	Harrow					
5	Seed drill					
6	Hoes					
7	Other					
B	Machineries					
1	Tractor					
a.	Trolly					
b.	Rotavator					
c.	Plough					
d.	Harrow					
2	Thresher					
3	Spray pump					
4	Other					

8. Livestock

Sr. No	Type	Number	Age (years)	Present value (₹)
1	Bullock			
2	Cow			
a.	Local			
	Milch			
	Dry			
b.	Hybrid			
	Milch			
	Dry			
c.	Calves			
3.	Buffalo			
a.	Pundharpuri			
	Milch			
	Dry			
b.	b. Other			
c.	c. Calves			
4.	Goats			
5.	Sheep			
6.	Poultry			
7.	Other			

9. Cost of establishment

Area : Year of planting : Name of crop :
 Variety : Number of plants : Planting distance :

[illegible]

11. Production and disposal of sweet orange

Sr. No.	Mode	Quantity	Value (₹)
1	Total production (qtl/tones)		
2	Home consumption (kg/qtl)		
3	Gratis (kg/qtl)		
4	Qty- used for processing (kg/qtl)		
5	Diseased and broken fruits (kg/qtl)		
6	Qty. sold (kg/qtl)		

12. Post harvest practices

1 Grading-Colour wise/Size wise/Weight wise

2. Do you grade the produce Yes/No

3. Name of different grades and qty. produced

Grade type	Quantity (qtl/tones)
Grade I	
Grade II	
Grade III	

13. Packing

Sr. No.	Size of packing	Place of market	Quantity packed	Cost of packing	Price realized
1.	10 kg karandi				
2.	10 kg box				
3	50 kg gunny bag				
4	Plastic kyarats				
5	Other				

14. Transportation

Selection of transport means : According to quantity/place and cost.

Sr. No.	Means of transport	Place of market	Quantity packed	Cost of packing	Price realized
1	Truck				
2	Tempo				
3	Tractor				
4	Own vehicle				
5	Other				

15. Selection of market place : According to price and easiness in marketing

Sr. No.	Market place	Marketing channel	Grade	Qty. (qtl.)	Rate/pack (₹)	Gross return (₹)	Total cost (₹)	Net return
1.	Local							
2.	Within state							
	1.							
	2.							
3.	Outside state							
	1.							
	2.							

16. Marketing cost of sweet orange

Sr. No.	Place of marketing and channel	Qty. sold (qtls.)	Grading cost (Rs)	Packing cost (Rs.)	Transport cost (Rs)	Market expenses (₹)				Total marketing cost (₹)
						Postage and telephone	Ham ali	Other charges	Commission charges	

17. Marketing Channels

- 1.
- 2.
- 3.
- 4.

18. Financial management

Sr. No.	Type of loan	Bank loan	Name of society	Total amount (₹)	Year	Interest rate (%)
A.	Quantitative					
1	Short term					
2	Medium term					
3	Long term					
B	Personal					
1	Money lender					
2	Relatives					
3	Friends					
4	Village traders					
C	Own fund					
D	Other					

19. Problems in sweet orange production

- 1.
- 2.
- 3.
- 4.
- 5.

PART-II

Wholesaler/Retailer/Commission agent/Pre harvest contractor

1. Name : Age : Education :
Occupation :
2. How many years you are in this occupation ?
3. Jurisdiction
4. How many sweet orange growers you have contacted during this season ?
5. During which month you go for contracts ?
6. Terms and conditions of contacts ?
 - a. Price
 - b. Harvesting
 - c. Grading
 - d. Packing
 - e. Transportation
 - f. Others
7. Do you give the advance to the sweet orange growers ?
8. Which variety you prefer ?
9. Total quantity of sweet orange marketed.
10. What facilities you have provided to the sweet orange growers ?
11. Marketing of sweet orange
 - a. Purchase of sweet orange ₹/Kg
 - b. Total for grading, packing, transportation and storage ₹/Kg
 - c. Selling price ₹/kg
 - d. Place of market
12. Annual average of price of sweet orange ₹/kg
13. Total commission from selling of sweet orange

8. VITA

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MASTER OF SCIENCE (AGRICULTURE)
In
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2015

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